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Martin Dewey, D.D.S., M.D., New York
Editor-in-Chief

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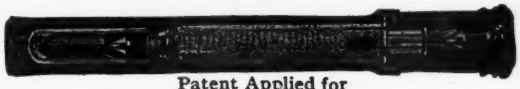

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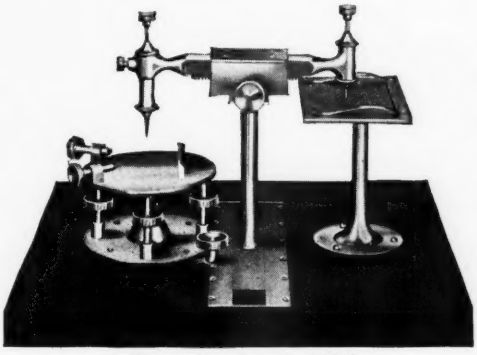

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VOL. VI ST. LOUIS, SEPTEMBER, 1920 NO. 9

ORIGINAL ARTICLES

A NEW TYPE OF MOLAR BAND AND LOCKING DEVICE FOR LINGUAL APPLIANCES*

BY JOS. E. JOHNSON, D.D.S., LOUISVILLE, KY.

FOR an orthodontic appliance to be a success, it must have secure anchorage; this anchorage is usually obtained by fastening appliances to molar teeth by means of bands on these teeth.

The most successful bands in the past have been the Angle and the Luken type bands; the objections to these bands are mentioned by Dr. Hawley in a paper he read before the American Society of Orthodontists in Pittsburgh in 1915, which are as follows:

(1) The Angle band has the bolt and nut on the lingual surface which is used to draw the band together; this is irritating to the tongue and by its size and unevenness causes the formation of pockets for the lodgments of food and debris between tooth band and adjacent tooth.

(2) The attachment of the bolt and short tubes to the band is weak and often gives way under stress.

(3) The free edge of the band turns back under the impact of mastication. If the bolt and tube are placed at the gingival edge so as to draw the band tight at the margin, this danger is increased.

(4) The uncovered portion of the tooth on the lingual surface is a source of danger and weakness and if the band is so made that the edge laps it is thick and clumsy.

(5) It also prevents the use of a verticle tube on lingual surface a most valuable form of attachment of the lingual arch.

I wish to add another objection which I think is the worst of all, namely, after a band has been on the tooth for some time the bolt on the lingual loosens

*Read before the Alumni Society of the Dewey School of Orthodontia, Chicago, Ill., April 1-3, 1920

slightly, which permits the cement to wash out. The band is still tight enough not to be noticed and when it is finally discovered you have a discolored or decayed tooth.

The form of clamp band that has a bolt on the buccal surface has several objections:

(1) If the band is fitted to the tooth in the best position the direction of the tube is often not correct and cannot be quickly and safely changed.

(2) No other attachment than the hollow bolt can be made on the buccal surface.

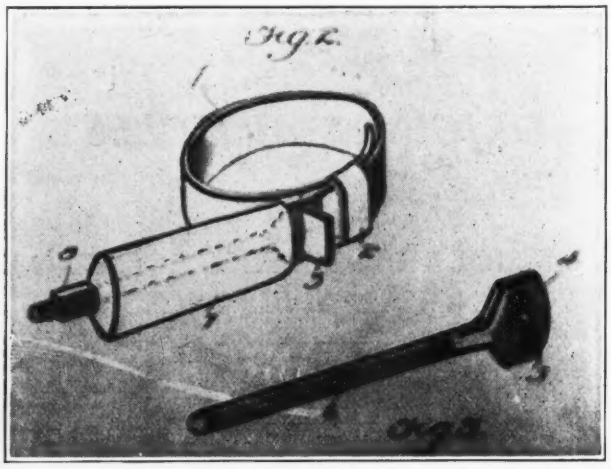


Fig. 1.

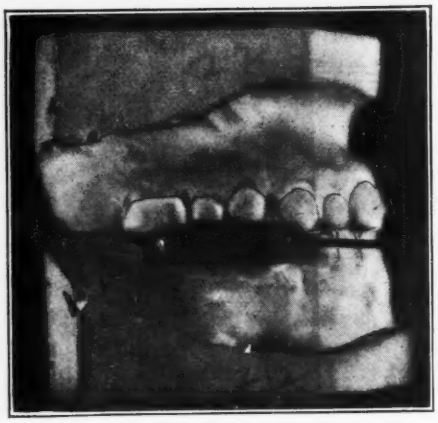


Fig. 2.

A. *B.*

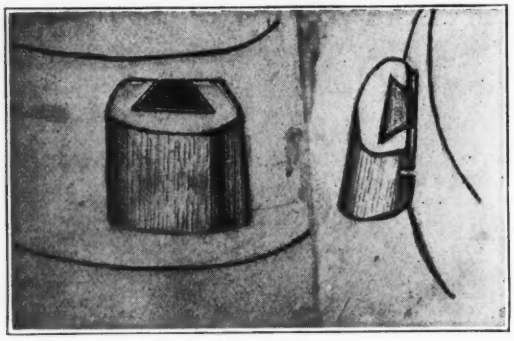


Fig. 3.

(3) The loosening of the bolt, permitting the cement to wash out and the consequent decay is also true of the Luken type band.

These many objections to clamp bands have caused a great many orthodontists to discontinue their use and to make plain bands for the molars.

The plain band can be fitted in the mouth or on a plaster model. The former is the quicker, but painful to the patient and it is also very difficult to pinch a band around a molar tooth in the mouth and have it fit accurately.

The making of bands on plaster models is more satisfactory, but this takes quite a bit of time and a good deal of experience to get the technic down, so that one can judge just how much to trim the plaster model at the gingival to have it fit the tooth accurately.

After trying both methods of making plain bands, which were unsuccessful in my hands, I came to the conclusion that if I could find a way to draw the band around the tooth by the means of a jackscrew and then remove it and solder the band, I would have a perfect fitting band. After some experiment I worked out the following band and jackscrew.

Fig. 1. The band consists of a strip of metal with a staple soldered at a half inch from one end. The other end of the band is trimmed so it will pass through this staple. This end is then passed through the slot in the jackscrew and bent down so it will not slip out. The nut is then tightened up until the sleeve of

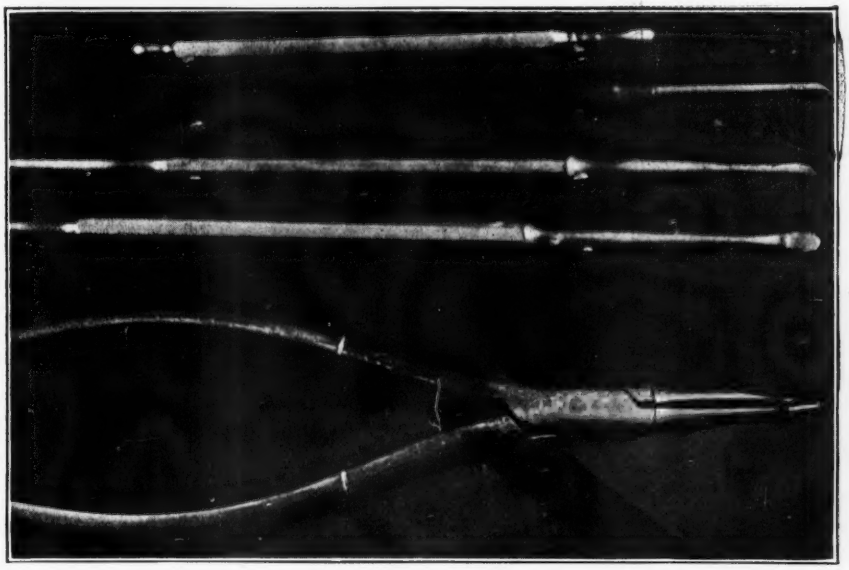


Fig. 4.

jackscrew rests against the staple on the band and the band is drawn up until it is approximately the size of the tooth to be banded. It is then slipped on the tooth with a jackscrew on the buccal side.

Fig. 2. With an orthodontic wrench the jackscrew is tightened until the band fits the tooth.

Your experience gained with clamp bands will tell you when you have the band tight on the tooth. I then burnish the band roughly to the tooth. With a sharp instrument I then mark the band at the staple, loosen the jackscrew and remove the band.

I now solder the band where it overlaps and unsolder the staple; this gives me a plain band which fits the tooth accurately, to which any attachment can be soldered buccally or lingually.

The lingual lock, Fig. 3-A, consists of a half-round bar soldered to the band, over this slips a clasp of clasp of gold; there is a square pin hole through the clasp

and bar near the occlusal Fig. 3-B. The pin is passed through the hole and drawn over the occlusal surface of the clasp and burnished into the groove, so that the force of mastication will not dislodge it.

This type of lock does not interfere with occlusion. Any form of lingual appliance can be soldered to it; there is practically no play, which is very essential to any form of lingual appliance.

Fig. 4 shows the instrument used for adjustment of lock.

Figs. 5, 6, and 7 show some appliances used with lingual lock.

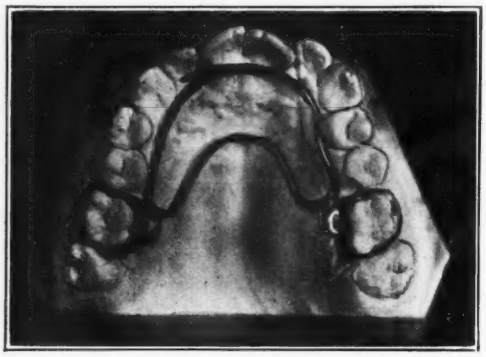


Fig. 5.

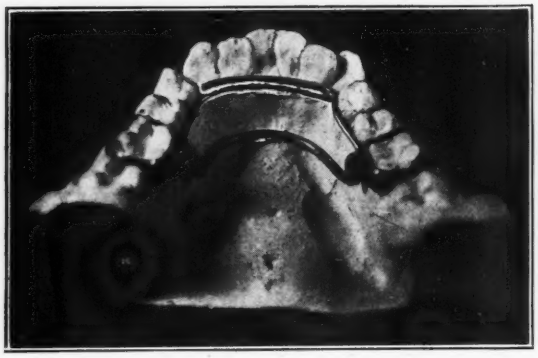


Fig. 6.

Fig. 7.

DISCUSSION

Dr. Max E. Ernst, St. Paul, Minn.—This paper is somewhat difficult for me to discuss. Dr. Johnson has shown some fine technic in the making of these appliances and it seems that the attachment is going to be a very valuable one. Not being much of a technician, I do not feel competent to discuss this appliance from a technical standpoint. However, I should advise you all to see Dr. Johnson's clinic, since you will learn more from his clinic than from his paper.

Having used no clamp bands in my practice, I can say very little about them. I should not think that they were indicated when using lingual arches, I thought that I could get a band by pinching it and contouring it that would fit as accurately as the bands that Dr. Johnston makes, but after seeing some of the bands in his clinic I am not so sure that I can do so.

Dr. Johnson's locking device interests me very much. With this device he gets an attachment which is almost as secure as a soldered attachment. In my work I have used

the half-round wire and tube as suggested by Dr. Mershon. There is always a slight play in this form of lock and I think that one of the strong points in this new lock is its stability. Another advantage it possesses is that a longer tube can be used in the lock because there is no arch wire above and lock wire below it.

This appliance may be slightly more bulky than that advocated by Dr. Mershon, but it looks like a very efficient one and I want to compliment Dr. Johnson on his fine technic.

Dr. Martin Dewey, Chicago, Ill.—In connection with my remarks I should like to show three slides I have picked out. One of the nicest things about this band technic Dr. Johnson has shown is the fact that you can make everything yourselves. The jackscrew can be constructed and a slide can be made.

So far as the mechanics of the thing is concerned, it makes a beautiful band, but the only objection I have to it is that the band is so thick. It probably does not make any difference in using a thick band; you can change the contour and fit it to the tooth itself. There is enough bulk and strength so that it stays there. With the thick band Dr. Johnson uses you could not make a band without the device. With band material of 34 or 36 gauge iridio-platinum, I can make a band without the clamp as Dr. Johnson does, although he tells me I cannot. It is not a question of time. He can make a band as quickly as I can without the device. It works satisfactorily, and the principal thing is to make the band so that it fits accurately. There is no question about the efficiency of it, and it pleases me very much because it is something you do not have to buy. He has given us a good technic without tying a string to it. The only unfortunate thing is you have to buy pins from a supply company. The dental supply companies make me as nervous as the dental hygienist. (Laughter.) These things can all be made. Instead of putting the attachments on the market and charging royalty and having them in the hands of some dental supply company, Dr. Johnson gives you the entire plan. You can buy this wire in foot lengths from any concern.

There is one thing which the essayist did not mention which he showed us in his room. As you cast the lock it contracts. He fits this wire so tight that you cannot get it out without forcing it. He forces this thing into the locking device. It fits accurately and is made so thick that it is strong enough to stay tight. Then the plan is to drill a hole through the seat for filling the notch through the wire, and that is set, and the soldered band makes a hole and you get a locking device. There is no danger of breaking this loose. The lock stays locked. As Dr. Ernst says, you get away from the thickness of the lingual wire on top of the tube, and the thickness of the locking device below the occluso-gingival angle. It makes by far a better locking device for a lingual appliance than anything I have ever seen, and it is something you can make.

I do not know whether you know it or not, but in the United States Patent Office there are several patents on locking devices for lingual appliances and buccal appliances. The patents have been taken out by members of the American Society of Orthodontists. Some of these patents have been taken out under names that people would hardly recognize. I have copies of these patents. This device is very effective, and the whole thing, with the exception of the locking pin, can be made by yourselves and with the ordinary wire used as a lock you avoid paying royalty to any one.

Dr. George B. Crozat, New Orleans, Louisiana.—In the first place, I feel that I must congratulate Dr. Johnson upon the results he has obtained. I am sure his appliance is more efficient than the one I am using which is similar, though removable. Dr. Johnson and I three years ago in Louisville discussed the matter of appliances, and at that time I explained to him the appliance which I use. A great many men differ relative to appliances as to whether they should be fixed or removable. I must say in my hands removable appliances have been rather satisfactory, though I do not use them altogether, I do to a large extent. There are many difficulties that arise in the use of removable appliances, for example, in having patients wear the appliances and of having them become loose or broken. If I do not get results with removable appliances for some case, one of two things must be wrong, the patient or the appliance, and advise the patient to discontinue their use. In these cases, it is my future intention to use Dr. Johnson's lock and appliance where they do not progress when using removable ones.

Dr. Johnson has gone further and has developed a locking device which is ideal. In constructing appliances, he embodies the principles of the appliances of Jackson soldered to his locks. Dr. Dewey criticized one point in Dr. Johnson's appliance, and that was the thickness of the banding material, and he has repeated it here. I think the criticism of the thickness of the band is well taken. If you use iridio-platinum you have a banding material tough enough or of sufficient tensile strength to resist the stress of mastication. Dr. Johnson does not use iridio-platinum. He uses, I think, 31 gauge Blue Island Brand banding material, and this banding material must be of sufficient thickness to resist the stress of mastication, and of that gauge it does it admirably. For such a rigid locking device as Dr. Johnson has developed, it is necessary to have equally as rigid a band; because when locking the lock, if the band is not rigid enough, it may be removed or loosened, and the effectiveness of the lock destroyed. Both lock and band must be rigid to be effective. For that reason, I think, it is an advantage and not a disadvantage to have a thick band.

Dr. F. C. Rodgers, St. Louis, Missouri.—I wish to compliment Dr. Johnson on his attitude toward the profession in giving us this appliance, with no string attached to it, as Dr. Dewey has said. It is the missing link in our lingual arches and locking device.

I wish to refer to a locking device I have seen which may perhaps solve the problem of buying pins which are part of a patented article. By drilling another hole, another slot in this device and inserting a double pin you will avoid the necessity of turning the distal end of the pin and bringing it over on the occlusal portion. A double pin, if properly aligned, will slip into the two slots and remain in there, and you can remove that with a hooked instrument and destroy it. Being round, it will slide into place and any discrepancy will be compensated for. That may be suggested as an improvement.

I would like to have Dr. Johnson tell us what technic he employs in soldering the locking device to the band so as to avoid flowing solder into that tube and taking care of that by drilling a hole in a certain place.

I think what Dr. Johnson has given is a wonderful addition to our technic, and I cannot express in words sufficiently adequate my deep appreciation of it.

Dr. Sydney W. Bradley, Ottawa, Ontario, Canada.—I first used the clamp band, but during the past year I have been using a plain band made of Weinstein metal Nos. 2 and 3. Some of this is .006 inch thick and some .005 inch thick. When I was in general practice I sometimes used the Twentieth Century steel tooth forms which were condemned and praised by members of our profession. I got in the way of using them for shaping my clamp bands before fitting them in the mouth, and now that I use the plain band made of stiff metal I still find them useful. After my separation, I measure the tooth to he banded with a piece of fine wire, and then get a steel tooth form which is just a trifle smaller than the wire measurement. I fit the strip of banding, cut the proper length, over the steel die, draw it together, using a pinch joint and then fit it in the mouth. You can fit it very easily in the mouth by using the Howe or Angle band-forming pliers. Dr. Johnson's method of soldering with the overlap is much neater than the pinched joint, but the latter can be trimmed and finished to be a neat joint too.

Dr. Lowrie J. Porter, New York City.—I would like to ask Dr. Johnson whether he has had any trouble with his appliance when used on the lower teeth. In using the Mershon removable arch, even where there is quite a little play, I have had some trouble in placing it in the tubes on the lower teeth of children with narrow arches and often fairly large tongues. I have found with the Mershon appliances that the more accurately they fit in the tubes, the more trouble was experienced in adjusting, and I wonder whether, with this lock, there will not be still more trouble in getting them in place.

Dr. John A. McPhail, Blanchester, Ohio.—I would like to ask Dr. Johnson if he has any way of paralleling these tubes? Do they fit accurately? How can you get the teeth in without paralleling them? Does he depend upon his eye?

A Member.—I would like to ask whether this appliance is applicable for fastening the labial arch to the band, and whether there would be any objection to that.

Dr. Johnson (closing).—There is no particular advantage in using the "Angle" lock pin. The reason I use it, is that they are already made up and accurately fit the pin hole that I saw into the lock.

If you wish to make your own pins, take a medium-sized ligature wire; say about a 26 or 27, run it through a gold rolling machine to flatten it out, dip the end in borax, hold over a blow pipe and you will get a nice head on your pin. These pins are really better than the "Angle" lock pins, for they have a better head on them.

Dr. Rogers asks how I solder the half round bar to band without getting solder in pin hole. There is not much danger in the solder running into the pin hole. I flow the solder on the band and then hold half round bar on band with pair of soldering pliers; as soon as the solder flows, remove from flame. In case solder flows into the pin hole, it is very simple to remove the half-round bar and re-solder a new one. Don't try to drill solder out of the pin hole because the pin will not fit accurately.

In reply to Dr. McPhail, I use my eye in paralleling the locks. It does not make any difference whether the locks are not exactly parallel, for there is enough spring in the appliance to let them go into position without trouble.

INDICATIONS AND CONTRAINDICATIONS FOR THE EXTRACTION OF TEETH FOR THE PURPOSE OF CORRECTING MALOCCLUSION*

By Martin Dewey, D.D.S., M.D.

Associate Professor of Orthodontia, College of Dental and Oral Surgery, New York, N. Y.

THE question of extraction for the correction of malocclusion has always been a point of conflict between various men in the practice of orthodontia. According to the title of this paper we are willing to admit that there are indications and contraindications for the extraction of teeth, and will endeavor to give you a few examples which will, to a certain extent, tend to illustrate what we mean by the above title.

We can say that the contraindications for extraction greatly outnumber the indications of extraction for the correction of malocclusion. Various types of malocclusion have been described as indicating and demanding extraction and in some instances the reason for these extractions have been based upon the diagnosis of the case as described by the writer. Therefore some of the disputed questions in regard to extraction have been waged around the diagnostic point in regard to the type of malocclusion that is present and in some instances writers who have advocated extraction and nonextraction have not been as far apart as at first we imagined. The old argument that extraction should never be resorted to in any case may be considered as being too broad a statement, because there are certain etiologic and pathologic factors present in some types of malocclusion in which a more serviceable result can be rendered to the patient by the extraction of one or more teeth. The question of extraction, however, in these cases is decided upon etiologic and pathologic factors, the age of the patient, the condition of the tissue surrounding the teeth, which means that other factors must be considered than the mere "class of malocclusion" as you recognize it according to the classification of the mesio-distal relation of the arches as adopted by this society.

Probably the two greatest advocates for the extraction and correction of malocclusion today, judging from their writing, are Dr. Calvin C. Case of Chicago, and Edward Canning of Denver, Colorado. It is my belief that the majority of the cases which these two writers cite in their text books as indicating extraction are cases in which extraction is contraindicated. In Chapter 14 of Dr. Case's *Principles of Dental Orthopedia,* published in 1908, he reviews the *Symposium on Extraction of Teeth,* which was held by the Second District Dental Society of the State of New York in February, 1905, and also refers to a paper by himself published in the *Dental Cosmos* for April and May, 1906. In this chapter he particularly calls attention to cases characterized by protrusion of the upper or retrusion of the lower teeth as demanding or not demanding the extraction of the teeth. He shows cases of "retrusion of the lower with slight protrusion of

*Read before the Twentieth Annual Meeting of the American Society of Orthodontists, Chicago, Ill., April 5, 6, and 7, 1920.

the upper" in which he states extraction is not demanded. The other cases which he characterizes as "protrusion of the upper with lower normal" and "protrusion of the upper with retrusion of the lower" and also "upper protrusion with retrusion of the lower jaw and teeth" are cases in which he desires extraction. In this chapter, he states that he has selected six typical cases which demand correction without extraction and twelve which demand extraction of the first or second premolars for their perfect correction, and "it is about in that proportion in this character of occlusion that the two methods of treatment, nonextraction and extraction are respectively demanded." All of these cases to which he has referred are cases which the majority of this society would classify as distoclusion, or cases where the lower arch has a posterior relation to the upper. In the majoity of these, Dr. Case contends, as does Dr. Canning, that the upper arch is the one that is at fault and we have protrusion of the upper with normal lower or only a relative degree of posterior relation to the lower arch. So in the beginning it is impossible for the writer to agree with Drs. Case and Canning upon the diagnosis of these conditions and will state that all of these cases which Dr. Case describes in Chapter 14 of which he says six should be treated without extraction and twelve with extraction I will say that extraction is contraindicated in all of these cases. As a result of this, I will further state that there is no type of malocclusion based upon anterior or posterior or mesio-distal arch relations in which one can say that extraction is demanded in all of a certain group. There are undoubtedly a few cases of mesioclusion in which the length of treatment can be shortened to a great extent by the extraction of one or more premolars. Mesioclusion cases in which we find a decided bunching of the lower incisors, or cases with labioversion of the lower teeth in relation to the upper in which it is the intention to retract the six anterior mandibular teeth bodily, may be advantageously treated by extracting a mandibular premolar. However, this class of cases is extremely rare, and in my practice has never been encountered.

Another condition which has been mentioned by Dr. Case and Dr. Canning is what is termed, "bimaxillary protrusion" in which they contend the teeth in both the maxillary and mandibular arch have taken an anterior position in respect to the face. I am willing to admit that if such a case ever existed extraction of the four premolars would be justified, but in my practice I have never seen it. Dr. Case has described these conditions for a number of years, and I sincerely hoped that when I came to Chicago, I would be fortunate enough to find such a case, as I was never able to find one in communities where I practiced here-tofore. I am willing to admit, for the sake of argument, that if bimaxillary protrusion existed, extraction would be justified, but I have never seen the case.

Another type of cases in which extraction is indicated is in mesioclusion cases with impacted lower third molars. In some mesioclusion cases it may be advisable to extract the second molars and allow the third to take the position of the second, but nevertheless this is a pathologic condition which makes extraction necessary, and the extraction is not performed because it is a mesioclusion case.

We find extraction of third molars indicated in neutroclusion cases where an eruption of the third molar is producing a bunching of the anterior teeth. Also in those cases where the third molar has become impacted and is producing an elongation of the second molar with the result that the bite is being opened.

Therefore in the treatment of malocclusion extraction of the third molar is indicated (1) in neutroclusion cases where the eruption is producing bunching in the incisors, or (2) superversion in the molar region which is producing an open bite in the incisors. We also find another type of neutroclusion condition in which there is a superversion of the first permanent molars produced by the eruption of the second molars that has resulted in an open bite condition and the lengthening of the face from the nose to the chin, in which case also extraction of the first molars is indicated for the purpose of closing the bite and producing a proper length of the face.

Another pathologic factor which will have an influence on extraction is that of devitalized and diseased teeth. If a patient presents himself to us for treatment with one or more teeth badly diseased, and in the light of modern knowledge we know the tooth can be retained but a short time without being a detriment to the patient, then the extraction of that diseased tooth is indicated and a compromised treatment should be followed which has been suggested by various members of this society during the last few years.

Another indication for extraction is found in mutilated cases where a tooth has been taken out of one arch and the case is treated with the idea of a compromise treatment to produce harmony in the size of the two arches by extracting the corresponding tooth in the opposite arch and allowing or causing the space to close. While these compromised treatments will not produce normal occlusion, it is the belief of the writer that they will shorten the time of treatment and render the patient a more effective dental apparatus than would be obtained if the spaces had been maintained and artificial teeth substituted.

Extraction may also be indicated in conjunction with missing teeth and the treatment based upon the same lines as suggested in those cases where we have mutilated arches or have been forced to extract because of pathologic involvements of the diseased teeth. However, in those cases in which missing teeth are present, it must be remembered that you have the two types of compromised treatment, that is first, endeavoring to close the space in one arch and leaving the normal number of teeth in the opposing arch, or second the extraction of one tooth in the normal arch so as to make the same number of teeth present in both lateral halves. In supernumerary teeth, the extraction of the supernumerary tooth is the general procedure, but in some instances we find the supernumerary tooth has assumed a much better position than the normal tooth and the supernumerary had also such a good shape that the length of treatment may be shortened by extracting the normal tooth and leaving the supernumerary in position. Another condition which has a bearing upon the indication for extraction is the age of the patient. The patient receives orthodontic treatment with the idea of improving the malocclusion, so as to render them a more efficient masticating apparatus, or to correct facial deformities. We find in older patients that the condition of the supporting structures are such that an extensive movement of malposed teeth is not indicated and then extraction may be resorted to, as the most feasible manner to give them an improved malocclusion, and also shorten the time of treatment. The age of the patient, the condition of the tissue and the length of treatment are factors which may decide in favor of extraction in any of the three classes of arch relation, for the purpose of producing a compromised treatment of that individual, which will be efficient. In those cases

we work for the purpose of improving the masticating efficiency of the teeth as being the more important than the ideal results, the obtaining of which is questionable, owing to the condition of the patient and other factors we have mentioned.

We find the age of the patient will also be a contributing factor in regard to the type of treatment indicated, especially in those cases where the loss of the upper or lower deciduous molars has allowed a drifting forward of the permanent molar so as to produce an abnormal locking of the molar region in one or both sides. Where the upper molar has drifted forward, these cases have erroneously been classified as unilateral distoclusion but according to the proper classification as suggested by Lischer they should be classified as "neutroclusion with mesioversion of the upper molar." Cases of the age of seven or eight should be treated by moving the upper molar back to its normal anterior posterior relation, developing the arches, so as to allow all the permanent teeth to assume their position, thereby establishing a normal occlusion of all the teeth. Cases more advanced in age, after all of the permanent molars have erupted, and all of them have taken an anterior relation to the lower molars, offer treatment by extraction. The upper canine and first premolar occupy the normal mesio-distal relation to the lower, therefore such a case is one of neutroclusion with mesioversion of the molars.

The second premolar is always impacted and if removed greatly shortens the time of treatment and gives the patient a serviceable masticating apparatus. These cases offer two plans of treatment: First, that of moving back or posteriorly the three permanent molars which would be a long procedure. The second and much shorter plan, and I believe the most wise plan, from the standpoint of time and efficiency, would be the extraction of the impacted premolar, leaving the maxillary molars to occupy their mesial position.

The question of the age of the patient and not the type of malocclusion would be the deciding factor between these two plans. Also in all cases of extraction in the treatment of malocclusion etiologic factors are the greatest deciding point, and not the type of malocclusion.

DISCUSSION

Dr. Varney E. Barnes, Cleveland, Ohio.—The setting up of rules indicating and contraindicating extractions for the purpose of correcting malocclusions, is a very dangerous procedure, particularly as a means of teaching young or old students of orthodontia.

Accentuating what Dr. Pullen has remarked, there cannot be extraction for the purpose of correcting malocclusions, except in cases of supernumerary or very deformed teeth that interfere with the placement of other teeth. Barring these exceptions, the extraction of the teeth is a compromise treatment of a deformity, not a method of correction.

The essayist's rules and suggestions for extraction are in the main to be condemned, since he has not shown full x-rays indicating (1) soundness of all teeth; (2) the proper placement of roots of adjacent teeth and (3) presence or absence of all teeth. Every time a tooth is extracted, whatever the necessity, the operator should be on the defensive. He should consider the effects of extraction from all angles possible at the time, and his defense, to be free from just criticism, should be well nigh perfect.

The advising of extraction in many of the cases illustrated seems like snap instead of sound judgment. In most or all cases it should seem advisable to first try the teeth under orthodontic stress to determine something of the possibilities in each particular case. Then, if undue resistance is met, extraction might prove a lesser evil, not a correction.

THE RELATIONSHIP OF FORM TO POSITION IN TEETH AND ITS BEARING ON OCCLUSION

(*Continued from page* 490.)

By Milo Hellman, D.D.S., New York City

THE GIBRALTAR SKULL

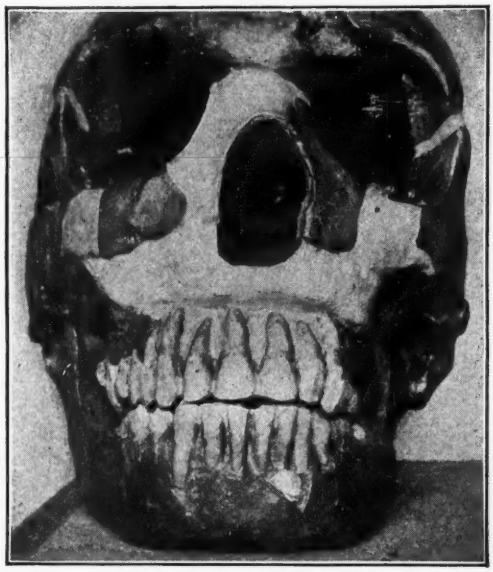
THE *Gibraltar skull* is thought to be that of a female. It was discovered in 1848 at Gibraltar. This was the first member of that race discovered in Europe. The restorations were also made by Prof. MacGregor. This as well as the other cast, is on exhibition at the American Museum of Natural History in New York City.

In the Gibraltar skull, the original fossil remains, the alveolar arch is quite well retained. The restorations made (Fig. 23) were limited to the incisors and

Fig. 23.—Dentition of the Gibraltar Skull. Occlusal view, showing restorations by Prof. McGregor of incisor and molar teeth.

the molars. But owing to the existing alveolar process and the remaining teeth the task of making a correct restoration was not extremely difficult though it entailed great care as to the accuracy of the prevailing primitive conditions. Thus, the molars are rhomboid in form and are set in a primitive position as regards their antero-posterior axis. The form of the premolar can not be described because they have not been thoroughly freed from the mineral deposits which as may be seen, obliterates their contour. Their position, as that of the premolars

in the Heidelberg lower dental arch is in alignment with the flat oval curve extending from the anterior (or mesial) surface of the first molar of one side to that of the homologous molar on the other side. The first premolar is, therefore, considerably more lingual than the second in the Gibraltar skull and more so than it is in later races of modern man. The canines, again, instead of constituting the terminals of the incisor arch which is rather flat or shallow, are



A.

B.

Fig. 24.—Dentition of *Homo Mousteriensis*. *A.*—Front view, showing edge-to-edge bite. *B.*—Right side view, showing occlusion close to normal.

included in it. The form of the entire upper dental arch is such as to come quite near the pyriform arch of the Orang.*

Two contemporary races made their appearance in Europe during the latter part of the Pleistocene (Glacial) epoch. One was the Mousterian, a Neanderthaloid race, the other the Aurignacian who according to some authorities is the forerunner of modern man.

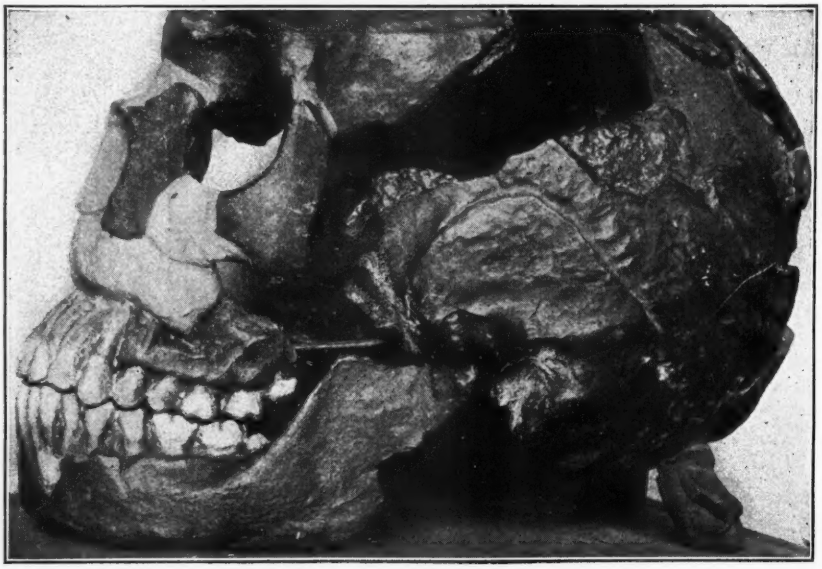


Fig. 24-*C*.—Left side, showing similar conditions as *B*, the teeth being prevented from coming into apposition by warping in the condyle region of the lower jaw.

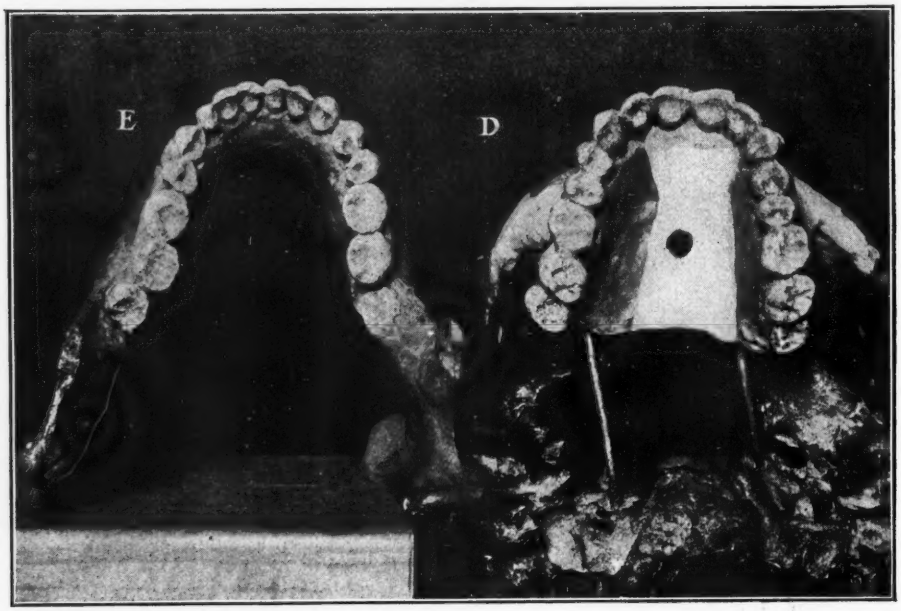


Fig. 24-*D*, *E*.—Occlusal view of upper *D*, and lower *E*, showing the difference in position of upper and lower canines and molars. (J. Leon Williams' collection, Am. Mus. of Nat. Hist.)

*See "Observations on the Form of the Dental Arch in the Orang," Internat. Jour. Orthodontia, February, 1918, IV, No. 2.

The remains of *Homo Mousteriensis* include a fairly complete skull with almost perfect dental arches. It is the skull of a youth (Fig. 24, *A, B, C, D, E*), with considerably large teeth. The upper central incisor, for instance, being 11 mm. mesio-distally and 8 mm. labio-lingually; the upper first molar 11.7 mm. by 12 mm. In form, the teeth, with the exception of the lower second premolar and upper third molar do not vary to any great extent from those of modern man, though in size they differ considerably.

The lower second premolar is considerably molariform possessing four cusps, the disto-lingual cusp of the modern tricuspid tooth is divided into two. The lower molars all have the hypoconulid and are therefore five cusped, the paraconid being lost, they are all of equal size. The upper third molars possess a decided hypocone as do the first and second molars in addition to which the first also has a hypoconule. It may also be stated that the upper incisors are rather flat labio-lingually as compared with their mesio-distal diameter at the

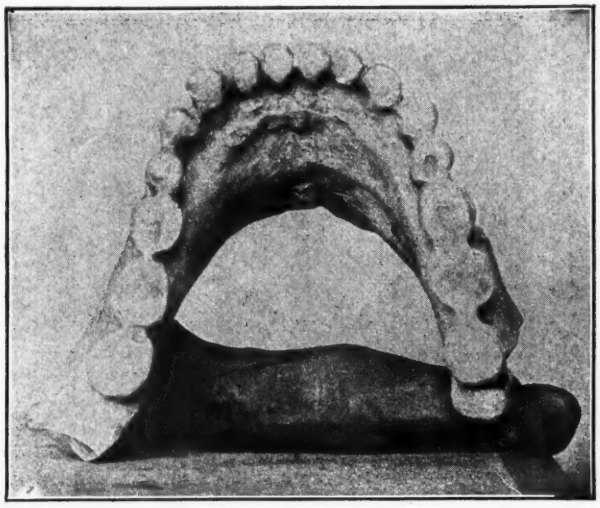


Fig. 25.—Lower jaw of Neanderthaloid individual. Occlusal view, showing primitive position of canines and conformation of lower arch. (Am. Mus. of Nat. Hist.)

incisal edge. The position of the incisors as well as the inclination of the alveolar process in that region, is rather orthognathous, approaching more modern man than that of the *Neolithic*. Their occlusion is that of a very slight overbite relation, as may be observed by the facettes on the upper central incisors.

The canines, while resembling those in modern man completely in form and position in the upper jaw, remain primitive in position in the lower jaw (See Fig. 24-*D* and *E*). The labio-lingual axis in the lower is directed more antero-posteriorly than in the Aurignacian or Modern Man. The left canine is still the deciduous member. Another point of interest may be seen in the left impacted permanent canine, Fig. 24, *A*.

The premolars are bicuspid in the upper and bicuspid (the first) and quadricuspid (second) in the lower. Their occlusion, of course, is of the interlocking type.

The molars in the upper jaw are rhomboid in form, rounded in contour, and retain the primitive trigone and hypocone. In the lower series, they are of the

Dryopithecus modification of the tuberculo-sectorial type of molar, having lost the paraconid though retaining the hypoconulid. In position, the upper exhibit their primitive character while in the lower the buccal cusps are more evenly aligned. The occlusion is of the primitive type, i.e., the protocone fitting into the talonid fossa and the hypocone into that of the trigonid. Owing, however, to a slight warping in the condyle region which probably occurred in the process of fossilization, the lower jaw can not be accurately adjusted in occlusion (see Fig. 24, *B, C*).

Another point of interest in conjunction with this specimen is attached to the difference in form of the upper dental arch as compared with that of the lower. On reflection it may be recalled that in the anthropoids, such association appears in a large number of cases. Owing to the difference in the character and nature of the teeth in the two jaws, it must be quite obvious that there should be a difference in the form of the arch to conform to the difference in

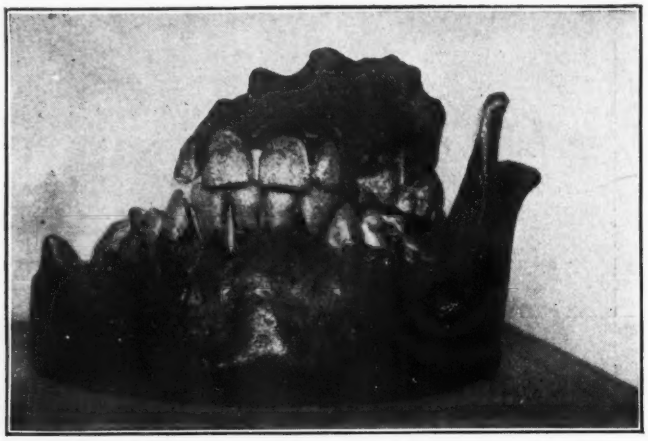


Fig. 26.—Dentition of a *Neolithic* young individual, showing form and position of upper left lateral incisor. (Am. Mus. of Nat. Hist.)

position of the canines and the deflection into opposite directions of the antero-posterior axis of the molars in the two jaws.

Another specimen (Fig. 25) of the same race, of a considerably older individual as indicated by worn surface of all the teeth, shows the same relative position of the canines on both sides and the form of the lower dental arch, in the incisor, canine and premolar region. Judging by the facettes on the incisors and canines one may be led to the conclusion that these teeth were in edge-to-edge relation.

Fig. 26 represents the entire lower and one half of the upper jaw of a very young individual of Neolithic time, as may be seen by the presence of some deciduous molars, the absence of the upper canine and the erupting lower canines and first premolars. The point of greatest interest connected with this specimen is the form and position of the upper lateral incisors. This is the oldest representative of man known to me to possess this form of lateral incisors and occupying the lapping position indicated. As will be seen later, this characteristic position may be due to morphogenetic conditions and is prevalent in many races in modern man.

THE DECIDUOUS TEETH OF MODERN MAN

Before taking up the dentition of modern man, it will be profitable to pause for a moment and consider several features associated with the human deciduous teeth. Although exhibiting generalized characters, the deciduous teeth of man form another link in the chain of evidence establishing the bond between lower animals and *Homo Sapiens.* Thus, there are several features in the human deciduous dentition that present primitive characters that closely resemble similar manifestations in the homologous series of the ape. In the deciduous teeth of man, the following points are of interest:

1. The incisors closely resemble those of the Gibbon in size, form and position. The only exception is the lack of the accentuated palatal cingulum in the upper incisors in man. In both ape and man they are vertical in position and meet in an edge-to-edge or overbite occlusion. The occlusion of the incisors is significant in relation to the development of their permanent successors and the antero-posterior relationship of the jaws. In order not to disturb the antero-posterior relationship of the two jaws, during the period of development of the permanent incisors, two manifestations become evident. The deciduous incisors become spaced considerably if they are in an over-bite relationship, or they remain less spaced if they assume the edge-to-edge occlusion. If neither of these conditions is fulfilled, due to disturbances not encompassed within the scope of this paper, there will result one of the various anomalies in occlusion of the permanent teeth. Thus, there may ensue:

a. A change in the antero-posterior relation of the two jaws, with or without complications in the antemolar region, or,

b. No change in the antero-posterior relation of the jaws will occur but complications may arise in the antemolar region.

Furthermore, the lack of spacing in the incisor region is only diagnostic of certain morphogenetic processes that become manifest in the permanent dental series. Thus, the permanent upper lateral incisors during their development before eruption, occupy one of two positions. Either they lap the distal end of the crowns of the central incisor with their mesial crown portion or *vica versa* they are lapped over their mesial portion by that of the distal of the central incisors. In either case there are certain features brought about in the position of the lateral incisor that reveal this condition when they subsequently take their position in the dental arch.

2. The canines are globular in contour and resemble the incisors of several species of Carnivora though being larger in form. The occlusion, simulating that of the incisors, is either in edge-to-edge or over-bite relation.

3. The molars differ in form and position in the two jaws and from one another in each jaw. Thus, the upper first molar, though being bicuspid in form, presents such sharp mesial and distal marginal ridges in connection with the cusps as to render the form of the cusps more like those of the permanent canines with cutting edges the buccal cusps being separated from the lingual by a deep and angular groove. In some instance there is a vestigial metacone present. The lower first molar on the other hand exhibits decided primitive features. It is tuberculo-sectorial in character, exhibiting a vestige of the protoconid-

paraconid shear; in the structure represented by the mesial marginal ridge; the buccal slope with the exaggerated gingival swelling resembles that of the first premolar in the anthropoids against which the large upper canine exerts its greatest functional activity. The metaconid is more distally placed than in the second molar or than in all of the permanent molars and resembles that of the anthropoids. The posterior moiety shows the talonid with its basin-like depression for the accommodation of the lingual cusp of the upper bicuspidate first molar. The other cusps on the talonid are the hypoconid, entoconid and a vestigial hypoconulid. In position this tooth resembles the sectorial, being obliquely set with the mesial surface antero-internally.

The second molars both upper and lower exactly resemble the first permanent molars in form, though being smaller in size, and their occlusal surfaces are more constricted as compared with those of the permanent teeth. The ridges and grooves are not as well defined and the enamel is more irregularly deposited than in the permanent teeth. The upper second molars retain the primitive trigon to which the hypocone is added. The lower as in the apes has lost the paraconid but retains all the other primitive cusps. The occlusion is of the primitive type, the protocone fitting into the talonid basin. Owing, however, to a slight rotation of the upper second deciduous molar appearing in a large number of cases in modern races, the primitive position of this tooth, involving its everted mesio-distal axis, seems to be changed and the molars are described as occluding cusp-to-cusp. If the palatal cusps, however, be examined, it will be found that the primitive relationship is maintained despite the buccal manifestation.

6. ON THE FORM, POSITION AND OCCLUSION OF TEETH OF MODERN MAN

In the lapse of time from Heidelberg man until now (about 250,000 years), there has been a considerable increase in number of individuals constituting the human family. The records, therefore, of modern man must necessarily embrace vast numbers of specimens. To approach anything like a complete study of modern man, presents, consequently, a problem of enormous proportions. Since it would be out of the question for one in the practice to devote sufficient time for such an undertaking, it is necessary to limit such desires in accordance with the odd moments available for study.

The material examined was obtained at the American Museum of Natural History of New York, and at the U. S. National Museum at Washington, D. C. It comprises the skulls of American Indians, Mongolians, Eskimos, Natives of Asiatic South India and some European Whites in the following proportion:

American Indians	U. S. Mus. 649 Amer. " 2719		3368
Mongolians	U. S. Mus.		207
Eskimos	U. S. Mus. 173 Amer. " 14		187
European White (Spain)	Amer. Mus.		6
Asia, So. India	Amer. Mus.		8
In all			3776

From the quantity of this material only those skulls presenting the best and most complete dentures in what is understood as "Normal" or nearest to "Normal" in occlusion were selected for careful examination and study.

The primitive characters observed in connection with the form, position, and occlusion of the teeth in the other groups of animals are also manifested in those of modern man. Moreover, these characters are *fundamental* and may be interpreted as being of evolutional significance and exhibiting racial peculiarities.

It is, therefore, necessary to treat this portion of our topic from the aspect of first, the general features *common* to all the dentitions examined, and second, those of *divergent* peculiarities.

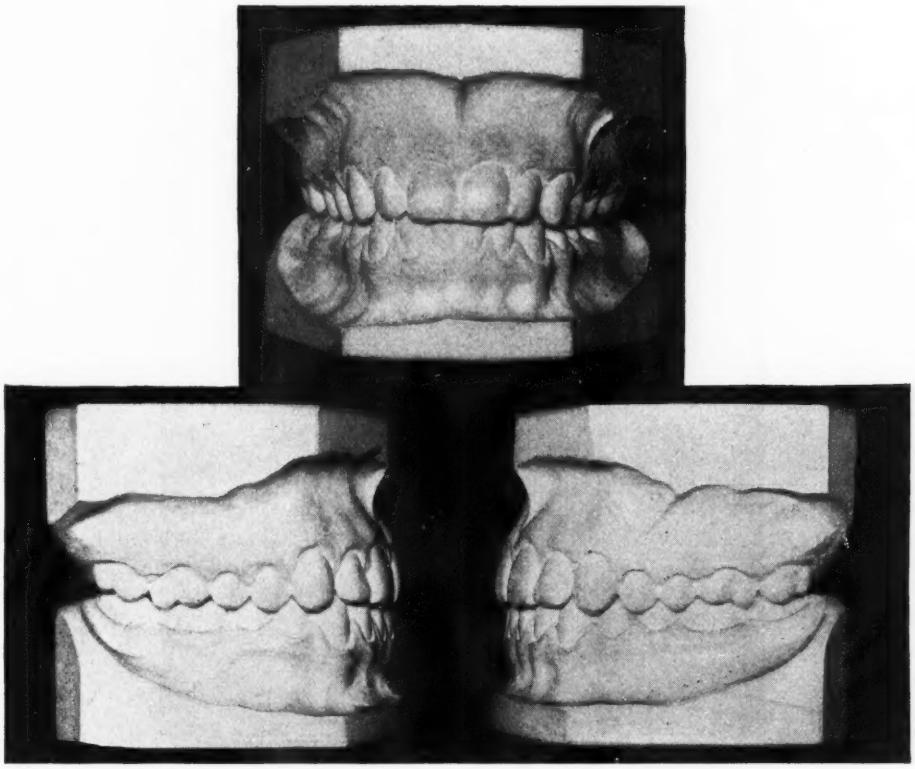


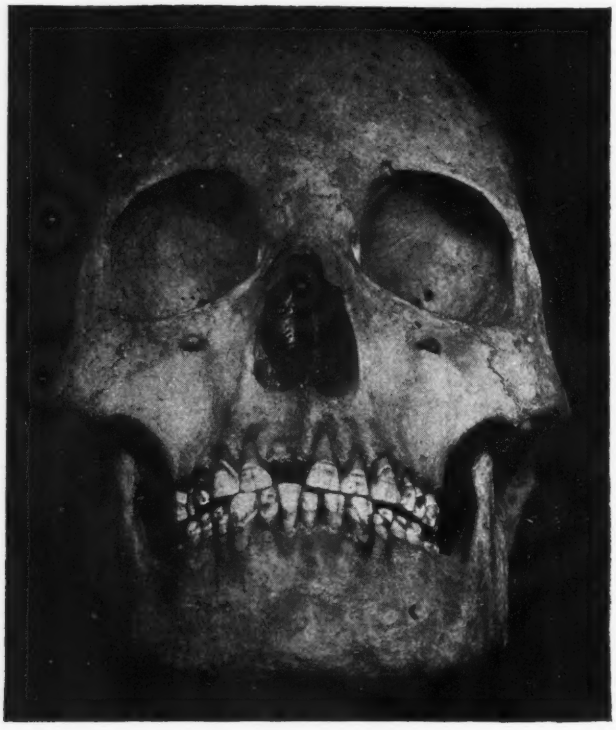
Fig. 27.—Casts of Dentition of modern white female. *A.*—Anterior view, showing position of convex lateral incisors and normal overbite. *B, C.*—Right and left sides, showing normal occlusion of premolar-molar series, convex laterals lapping the distal portion of the central incisor.

THE ASPECT OF THE GENERAL FEATURES COMMON TO THE DENTITIONS EXAMINED

Under this heading the form and position of all the teeth in modern man may be included. The incisors, for instance, having acquired the human form with which you are all well acquainted, vary little in general. In contour, they may vary in different races and in certain individuals of the same race. Thus, the mesio-distal labial aspect of the crown in the upper incisors may appear as a flat surface in one instance, as in many Indians, and Eskimos and in others they may be decidedly convex. The lingual surface on the other hand may vary from a simple plane to a decided concavity. This form is found to be associated with the horizontal position of those teeth. Thus, the flat centrals in the Indian

are found usually everted at the distal angle, while the extreme convex laterals are found lapping the centrals in other races as in the neolitic. In their long axis the incisors may present a straight line from root apex to crown edge, or a considerable curve approaching somewhat that in the orang incisors; or, they may present a double curve, concave labially in the root region and convex in the crown. In position they are all vertical, though varying in degree of inclination in different races and in the individuals of each race. In occlusion they are either in an edge-to-edge or an overbite relation.

The proportionate difference in dimension between the upper centrals and laterals is not as marked in Man as in the anthropoids. Though the lateral incisors vary considerably in form and position, they may be identified by two



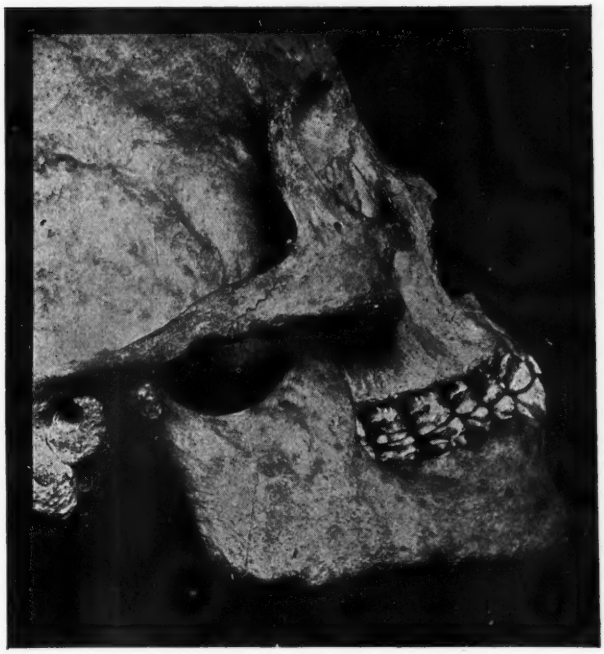
A.

Fig. 28.—Dentition of Eskimo. *A.*—Front view, showing flat type of incisors in edge-to-edge occlusion.

distinctive manifestations. In the one, the labial surface is considerably convex mesio-distally, quite narrow at the neck, and its incisal edge is very much pointed at the mesio-incisal angle; while the distal incisal angle is very obtuse, presenting an aspect as though the entire crown is curved with the concavity on the mesial. The position of a lateral incisor of this description is invariably such as to permit the mesio-lingual angle to lap the disto-labial of the central incisor (Fig. 27, *A, B, C*).

In the other instances, the lateral incisor presents a flat labial and lingual surface. Very often a vertical shallow groove may be seen on the labial surface. Such laterals invariably do not lap the centrals, but may in some instances be slightly lapped by the centrals, as in the Eskimo dentitions, Fig. 28, *A, B, C, D,*

E, also Fig. 1, *D* shows similar characteristics. These two distinctions are strongly indicative of conditions anteceding the crown eruption of the laterals and are suggestive of inalterable developmental modifications in form. Whether such modifications are merely chance variations or produced by some dominating force remains as yet to be determined, certain it is, that the two described positions of the laterals are closely associated with their form.



B.

C.

Fig. 28-*B*, *C*.—Right and left sides, showing normal occlusion of premolar-molar series and the lingual tendency of lateral incisors.

The lower incisors present less modifications in form as well as a less difference in proportions between the centrals and laterals. In position it may be noticed that the lower incisors are very rarely evenly aligned when the upper incisors are in exact proximate contact. This is true of all dentitions examined. The only exception noticed to this general observation is manifested when the upper incisors are spaced.

The canine of modern man as that in our primitive ancestor is not materially changed in form, from that in the earliest forerunner of the primate order,

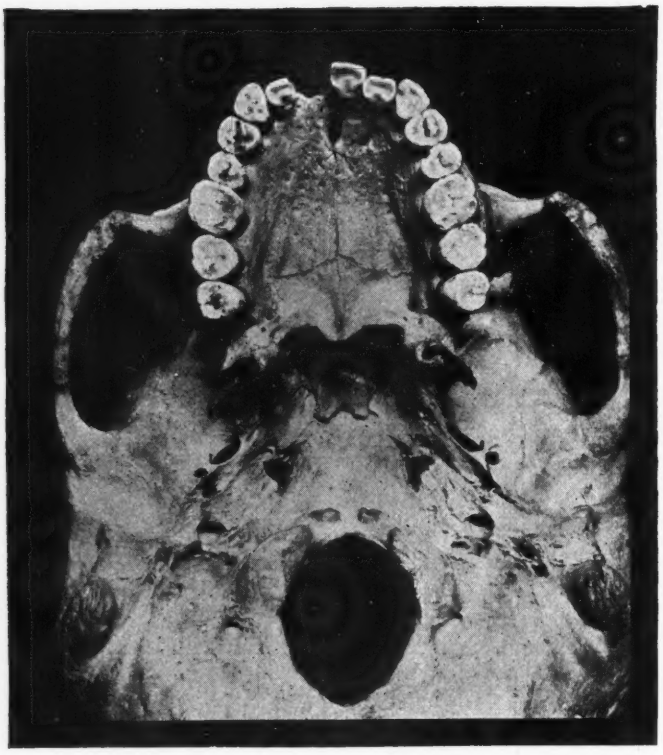


Fig. 28-*D*.—Occlusal view of upper dental arch, showing tendency of central incisor to lap the lateral, primitive position of molars.

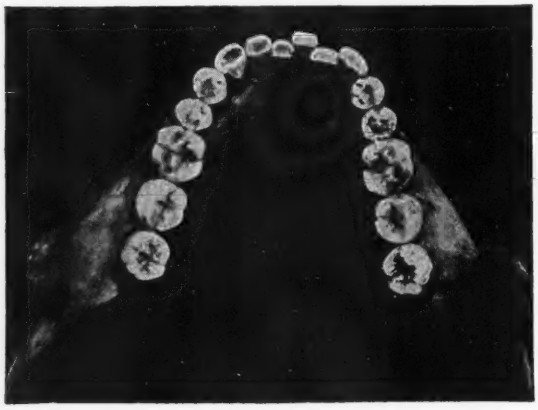


Fig. 28-*E*.—Occlusal view of lower dental arch, showing lapping of incisors and primitive position of canines. (Am. Mus. of Nat. Hist.)

Parapithecus. Unlike the canine in the lower apes and anthropoids, it remains a more generalized organ, while in the other primate families, this tooth has become specialized in adaptation for certain functions. Man through the progressive evolution of his brain developed the use of his hands and with the aid of certain implements, the canine functions of the anthropoids for grasping, tearing, cutting and fighting are substituted. It is therefore, not improbable man may never have had large canine teeth resembling those of the apes, but rather may have developed along lines with small canines but with intelligent brain and skillful hands.

In position, the canine of modern man varies only in degree from that attained in the Heidelberg man, and not at all from the Neanderthal. In the upper jaw, its mesio-distal axis is so placed as to produce a continuity in the curve of

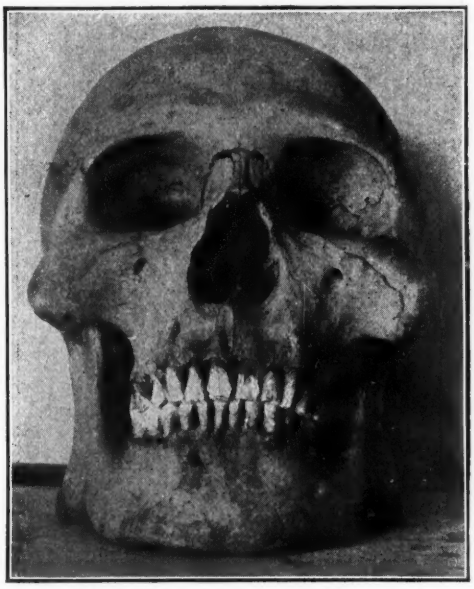


Fig. 29.—Mongolian Dentition. *A.*—Anterior view, showing normal occlusion with considerable overbite in the incisor region.

the incisors and that of the premolar-molar series, in contradistinction to the anthropoids where in position they partake of the arrangement in the alignment of the premolar-molar series alone. Although the Heidelberg and Gibraltar dentitions show a decided deviation from the ape mode of tooth arrangement, it is in the Neanderthal race that the position of the canine which we retain to this day is definitely established.

The lower canine, though somewhat reduced in dimensions from that of the ancestral predecessor, retains its primitive position with most accurate precision. It is a most curious fact, but nevertheless true, that the lower canine as well as the post canine lower teeth in modern man are found to follow quite closely the positions of the homologous teeth in primitive man. Thus, its labio-lingual axis quite frequently is directed antero-posteriorly and it still persists in associating itself with the incisor alignment, in contrast to the upper canine tendency.

The premolars are extremely erratic in size, form and position. In size they vary considerably in different races, in the individuals of each race and in the different teeth in the same dentition. Thus, usually the first upper premolars are larger than the second and *vice versa* in the lower jaw. But the exceptions to this rule are so numerous as to cause confusion as to the rule and the exception. In form they are bicuspidate in the upper jaw, and in the lower the first has a well developed buccal cusp and lingually it has accentuated cingulum or a vestigial cusp. The second lower premolar is either bicuspid or tricuspid. The tricuspid lower premolar simulates the primitive tritubercular form of tooth, with the protoconid, paraconid and metaconid. And in occlusion this tooth is representative of the wedge type of occlusion, the three cusps like those in primitive forms fitting between the upper premolars. The lingual cusp of the upper

Fig. 29-*B*.—Occlusal view of upper dental arch, showing flat incisors, the centrals tending to lap the laterals, primitive position of the molars and difference in arch outline from that of the lower.

second premolar occluding within the vestigial talonid basin formed by the distal marginal ridge distally and the buccal and disto-lingual cusp mesially. In position the premolars are also erratic. While the upper premolars, with some exceptions assume their positions in conformity with the canine-molar outline, the lower premolars assume positions resembling more those in the Neanderthal dental arch. The reason for such irregularity in position may only be found in the explanation of a general tendency toward irregularity in the shedding of the deciduous molars and eruption of the premolars, probably causally related to evolutional processes. On the casual observation of this phenomenon, it has been found that in a large number of individuals with normal dentitions, these teeth exhibit such peculiarities. These peculiarities are also found to exist to a high degree in certain families.

Inasmuch as evolution has produced a change in the number of the incisors and premolars altering the original placental mammalian dental formula of 3, 1, 4, 3, by the reduction of one incisor and two premolars, on each side of each jaw it seems that its potency has not as yet been expended and is yet to be accounted for. The constant modification in form and position of the lateral incisors and the peculiarities associated with the premolars are undoubtedly most ominous phenomena regarding the fate of the future dental formula of Man in these particular regions.

The molars all retain their primitive form with the exception of the lower second tooth. The upper molars still possess the primitive cusp formula identified with the trigon, and while the first almost invariably has a hypocone, the second and third may have it at times well developed and at others vestigial in form or entirely lacking. The lower molars still retain the primate cusp formula lacking, of course, the paraconid in all and the hypoconulid in the second molar only.

As regards their position, it may be said in a general way that the molars

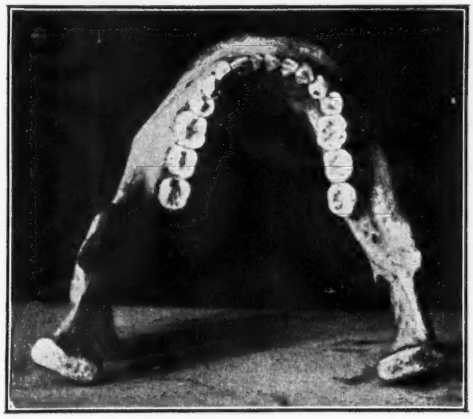


Fig. 29-*C*.—Occlusal aspect of the lower dental arch, showing lapping of incisors, primitive position of canines and difference in arch outline from that of the upper. (Am. Mus. of Nat. Hist.)

adhere to the primitive manner of aligning themselves in the dental arch. Thus, in the upper jaw, for instance, the mesio-distal axis is obliquely set to the outline of the dental arch; i.e., if a succession of lines be drawn parallel to the buccal surfaces of the upper molars, the anterior ends would be directed antero-externally. There may, however, be some slight variation to this position in the first molar only in certain instances, the second and third upper molars deviate very rarely from this position. And when they do, they approach more an anomalous manifestation.

In the lower jaw, the molars differ in position from those in the upper. The lower molars are arranged in such a manner as to place the buccal cusps in an evenly aligned series. It is only when the first upper molar deviates in the slightest manner from its primitive position that the lower second molar will be slightly rotated mesio-buccally.

The occlusion in the dentition of modern man has retained its primitive features *in toto*. The molars as in the primitive placental mammals, in the anthropoids and in primitive man still maintain the same relationship; the

protocone still fitting into the talonid basin, and the hypocone into that of the trigonid. In the premolars, the primitive wedge-type of occlusion persists; in the incisor-canine region, the edge-to-edge and overbite relation is manifest (see Fig. 14).

It must be emphasized at this point that the reason the evolutionist and paleontologist designate the molar occlusion by the lingual cusps in the upper and the fossae in the lower molars, is because first, these points constitute the most primitive form of molar occlusion and is still preserved in all mammals possessing molar or premolar teeth. Secondly, because of the extensive modification of the buccal aspect of the premolar-molar series, from the primitive tritubercular type to the omnivorous type of tooth, the buccal cusps were always obscured by various structures associated with that region of the tooth. Thirdly, the various forms of structures developing on the buccal surface of the molar teeth have invariably played a secondary part, mainly as an aid of the main functional portions of the crown. Lastly, the primitive cusps of the upper fitting into the fossae of the lower molars are associated with the primary functional activity as they are the elements constituting the mortar and pestle efficiency necessary in grinding and triturating the various food substances comprised in animal diet.

It would seem of considerable importance if the orthodontists would adopt a similar plan of procedure, especially with regard to the classification of the occlusal anomalies. As has been suggested above, the buccal cusps are at times liable to misrepresent the true relationship of the molars. By a slight rotation of the molar on its long axis antero-internally, the buccal cusps assume a point to point or distal relationship (Class II, Angle) while the mesio-lingual cusp of the upper molar (protocone) has as yet not exceeded its divergence from the primitive, normal position to justify such a classification if it be based on functional significance. Another important and to my mind fundamental reason for following the scientists' distinctions rests with the following fact: In aligning the teeth to any conceived form of dental arch, as proposed by various methods and schemes of determining or predetermining it, the buccal cusps of the upper molars and the buccal grooves of the lower molars are usually taken into consideration to a greater extent than is necessary.

As has been shown, the buccal aspects of the upper molar, in the best dentitions exhibited are arranged in a manner that is not in accord with such schemes but is in harmony, nevertheless, with the nature of the tooth and brought about by evolutional processes. As it is a primitive feature still retained in modern man, it should receive more care and consideration before the primitive position is altered.

As evidence of the erroneous idea involved in the arrangement of the buccal cusps of the upper molars according to a certain arch outline may be observed that in almost all Class II cases of malocclusion, the molars as a rule are inverted from the primitive direction of the mesio-distal axis. Instead of the anterior direction being everted as under normal conditions it is inverted. One of the most important steps to be taken in all Class II cases is to restore the upper molar to its primitive position. And where the protocone has not exceeded the limits of its ancestral relation, the apparently "distal occlusion" will readily be

remedied without any other means. The assumption is, therefore, unavoidable that in a proper diagnosis of cases, as well as in their correct treatment, the lingual cusps of the upper molars are of greatest importance. And if in the various dental arch designs, this feature would be taken into consideration, they would be of more value than was hitherto the case.

In the lower jaw, the buccal cusps assume an homologous significance to that of the lingual cusps in the upper. However, what is of importance and must not be left out of sight at any time from the classification of a case to the completion of treatment, is the primitive points of occlusion, and if they be restored

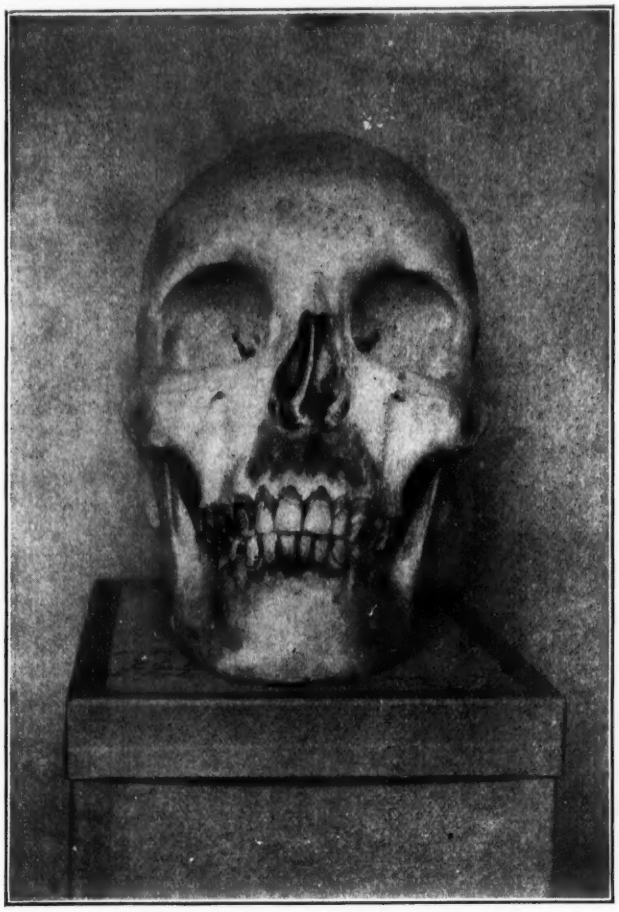


Fig. 30.—*Dentition of Hindoo. A.*—Anterior view, showing normal occlusion with slight overbite of incisor.

in anomalous cases as they are retained under normal conditions, not overlooking, of course, the primitive positions characteristic of those teeth, the alignment of the buccal cusps of the upper, like that of the lingual cusps of the lower molars, will take care of itself.

DIVERGENT PECULIARITIES

The *divergent peculiarities* observed in relation to the dentitions examined, are manifested mainly in the form of the dental arches and in the manner of incisor occlusion, a characteristic of certain races. As the problem of the dental

arch form has been dealt with at a previous occasion it will suffice at present to demonstrate, in passing, such peculiarities in form as are existent in the three different races, the Mongolian, the Eskimo and the Hindoo, Figs. 28, 29, 30. Note the general outline of the upper dental arch, as compared with the lower, and note also the position of the canines in the different arch forms.

The other diversity refers to the incisor occlusion. Thus, it is a well established fact that in primitive man, as seen in Homo Heidelbergensis and Homo Neanderthalensis, the incisor occlusion was in an edge-to-edge relation. This

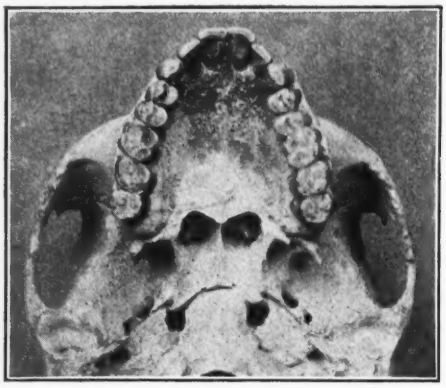


Fig. 30-*B*.—Occlusal view of upper dental arch, showing considerable difference in form from that in Fig. 29, and differing from its lower mate.

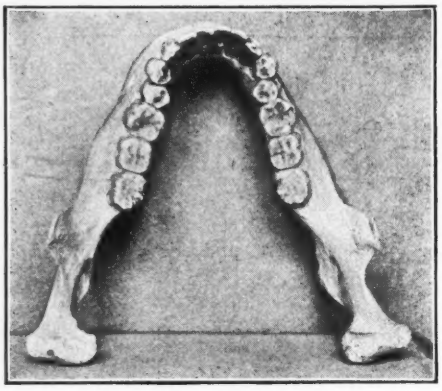


Fig. 30-*C*.—Occlusal aspect of lower dental arch, showing difference in form from that of the upper. (Am. Mus. of Nat. Hist.)

form of incisor occlusion seems to have been the prevailing type, until a quite recent period of geologic time. As Keith points out, "in Anglo-Saxon times almost the entire population possessed an edge-to-edge bite. After the lapse of less than a thousand years ninety-five per cent of the modern Englishmen possess an overbite." In the skulls examined the American Indians (Fig. 31) exhibit an edge-to-edge bite exclusively as do also the Eskimos. The European white (Fig. 32) and the natives of Asiatic South India (Fig. 30) present an overbite the extreme of which is reached in the Mongolians (Fig. 29.) Of

course, the number of skulls of the Hindoo and the White was so small that nothing of a definite opinion could be formed. But I am informed by Dr. Weinberger that the examination of the teeth of the Whites here during the recruiting activity revealed the fact that the edge-to-edge bite was prevalent in a high percentage of cases in the adults of military age examined for U. S. service.

Crystallizing the main ideas implied in the remarks made on this topic, the conclusions can not be avoided:

1. That hitherto the conception of "Normal Occlusion" was based upon an ideal insufficiently supported by concrete evidence.

2. That investigations of extensive collections of anatomic material reveal the fact that the best dentitions do not correspond to the conceived abstract ideal.

3. That interpretations based upon this fact must necessarily imply a con-

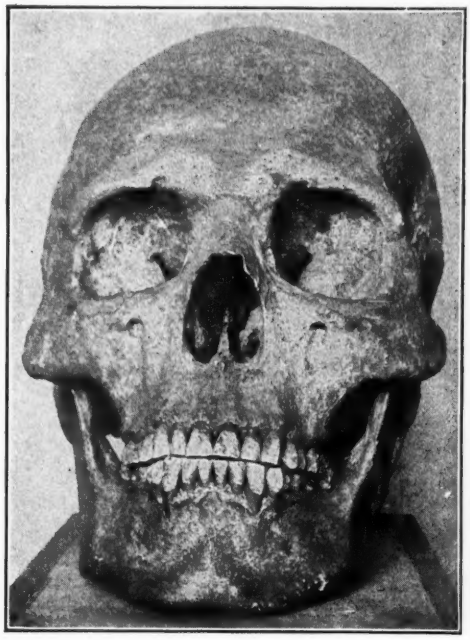


Fig. 31.—Dentition of American Indian, showing the prevailing edge-to-edge bite. (Am. Mus. of Nat. Hist.)

ception of the normal as encompassed within a border-line of such proportions that will permit of modifications in detail *without a change in type.*

4. That this border-line which permits of some modification in *individual manifestations* is what is termed the *territory of normal variation* and it belongs to the type by the right of *frequency* as does the "ideal" by the right of *perfection.* For instance, because "Sandow" represents the ideal in strength and physical development, it does not prove that all those not corresponding to such criterion, as represented by him, will be abnormal. It is the standard adhered to by the greatest number of individuals free from disease, weakness or deformity that decides the question of type or that of normality, and not the individual personifying an ideal that may have been artificially developed by intensive and careful training. He may be more rightfully considered the extreme.

5. That the illustrations, moreover, reveal the fact that although they present dentitions *considerably* superior to the average, they may not correspond with the *generally conceived ideal of the orthodontist.* It must, however, be conceded that they represent a normal type, *the human type of dentition,* and that this was developed along evolutional lines as may be proved by the primitive feature still retained.

6. That these primitive features, embracing as they do such characters as number, form, position and occlusion of the teeth, must be of greater significance to the orthodontist than hitherto realized.

7. That since the orthodontist is mainly concerned with changes in *position* of teeth and their effect upon occlusion, it is of paramount importance for him to have a keen appreciation of the results obtained by Nature in her ceaseless efforts

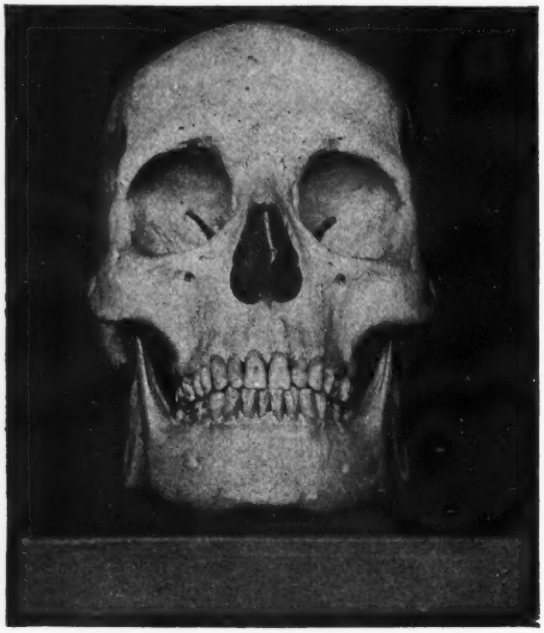


Fig. 32.—Dentition of European White, showing the prevailing overbite. (Am. Mus. of Nat. Hist.)

during vast periods of time, as well as the means employed by her in retaining those modifications in the infinite variety of functional adaptations as revealed to us.

8. That since it is beyond the possibility of orthodontia to exert the slightest influence toward the modification of a tooth in its form, and since the tooth-form has retained most of its primitive features, it is imperative to base the modification in its position in accordance with these *ancestral characters* following the plan as laid down by evolutional records. For, unless these conditions are fulfilled first, there will always be a tendency on the part of nature to assert herself by a modification of all orthodontic procedures not in accord with her dictates. If we would, therefore, work *with* nature and have her approval and assistance, we must confine our efforts in a more strenuous endeavor to learn to understand her, accept and appreciate her guidance by the recognition of her laws as laid

down in the form of all *primitive characters* and their various modifications as found to be associated with the dentition of man.

It is with considerable gratification that I acknowledge the valuable information obtained from the works mentioned below for the preparation of this paper. I also am greatly indebted to Dr. Wm. K. Gregory of the Museum of Natural History for his help, advice and judgment in the selection of extensive material for study.

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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

A RESUME OF CASES TREATED INVOLVING THIRD MOLAR INFLUENCE*

BY DR. H. L. MOREHOUSE, SPOKANE, WASH.

I FEEL that none of us are given to telling the other fellow of our mistakes as much as we should, for by our mistakes we learn the more, or at least we should. Therefore, I have two objects in view in presenting this paper, first to give a report of the cases I told you of two years ago and the satisfaction I have had from them; also to tell some of the disappointing things, not what would exactly be called failures, but delayed successes, for in the end I feel that I have overcome them as far as is within human possibility.

In the paper I gave two years ago, I cited cases where I had extracted impacted lower third molars and upper second molars in order to overcome the force exerted by them which threatened the future permanency of the cases, and many times practically prevented the satisfactory treatment of such cases.

The first case, I reported to you the last time, was that of a girl fifteen years old with a Class II, Division 1 case, in which I found by radiograms badly impacted upper and lower third molars. In the case of the lower thirds they were forcing the first and second molars into a position of supraocclusion and the impacted upper thirds made it impossible for me to obtain satisfactory mesio-distal occlusion. In this case I had the upper seconds removed and the lower thirds, and up to this time I have found no change in the normal relation of the teeth.

The next case was one of Class II, Division 2 in which radiograms disclosed only impacted lower third molars which were causing supraocclusion of the first and second lower molars, giving the effect of infraocclusion of the rest of the teeth. In this case the parents refused to have the lower thirds removed, delaying them for nearly a year, and finally when they were removed, it was apparent that

*Read before the Pacific Coast Society of Orthodontists, February 17-19, 1920, San Francisco, Cal.

Nature had filled in new bone beneath the first and second molars with the result that the teeth never returned to their original position and it was re-treated later in St. Paul as one of infraocclusion of the anterior teeth.

Fig. 3 is a case exactly like the one just described, with the exception of being a Class I case, but in this instance the parents saw to it that the removal of the lower thirds was done immediately upon my advice, and the teeth, after about

Fig. 1.

Fig. 2.

three months, settled back to their original position. When I saw the patient last fall, the normal occlusion had remained absolutely perfect.

Figs. 4 and 5 are of Class II, Division 2 case, mutilated on one side with an unerupted upper second premolar on the other. This case is similar to many that come into our hands, usually with both upper second premolars impacted, the first molars having taken the position of the impacted tooth. This slide will show you the condition that will develop if the first and second molars in these cases are moved to their normal position, namely badly impacted upper third molars and the second molars at such an angle as to be of very little use for mastication. As I told you in the beginning of my paper, this is to be an exchange of confidences and as such I must say that the question has arisen a good many

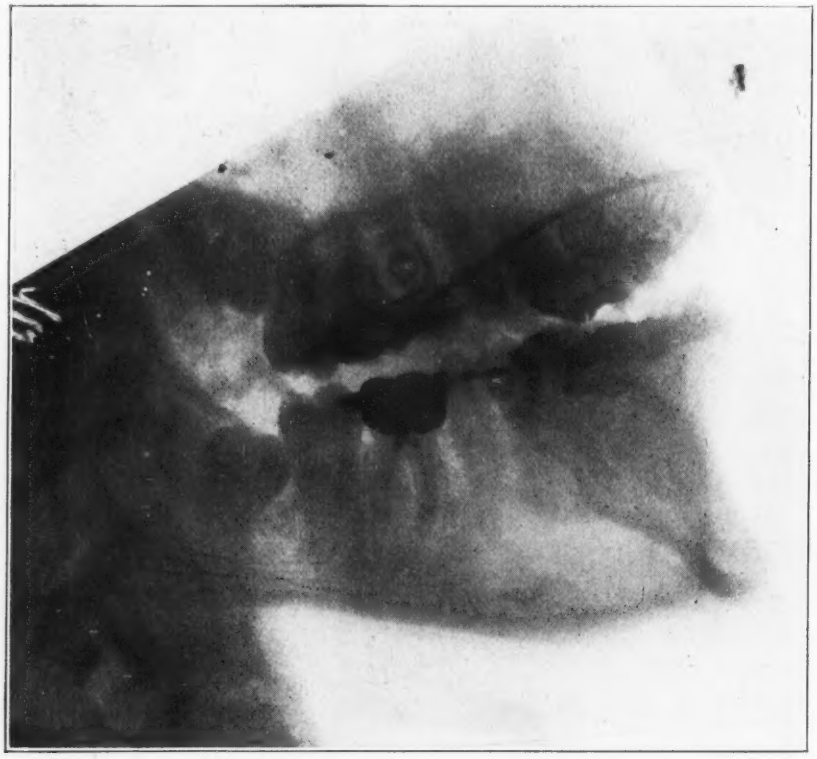

Fig. 3.

times in my mind just what was the proper policy to pursue in such cases as I just mentioned. Is it a more sane policy to extract the upper second molars and make room for the impacted premolars, letting the third molars later on take the place of the extracted second molars, or to advise the removal of the impacted premolars, thus reducing the time of treatment by over half? The last time I made mention of this point those who discussed the paper I think failed to note that I was trying to start a discussion. I hope that they will not overlook the fact this time.

Fig. 7 was one in which I had my greatest disappointment, for after I had treated this case of Class II, Division 1, and the teeth had held perfectly for a number of years, both upper and lower arches began to buckle, and the slide will

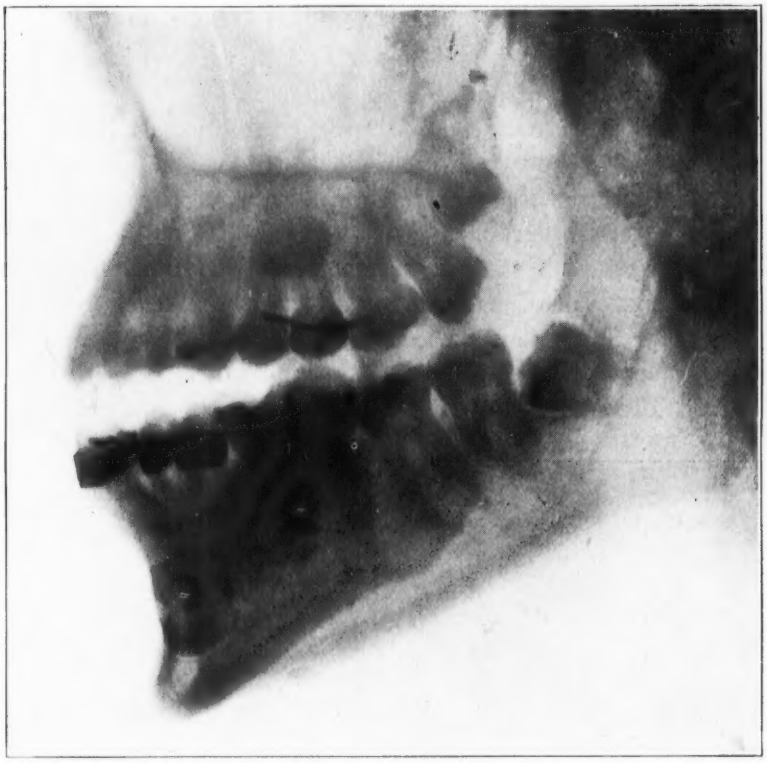

Fig. 4.

Fig. 5.

show the reason, and even then the parents and the young lady refused to have the third molars removed, and so far as I know have never had them removed, for I refused to be responsible any longer.

In connection with these cases I wish to call attention to those Class II cases in which the symphysis shows a lack of development. I feel that this type of Class II case needs a great deal more careful study, especially from the facial point of view, than any other. Dr. Angle says: "The study of orthodontia is indissolubly connected with that of art as related to the human face." The truth of this statement all of us realize more and more each year we practice, but, like many other things that we know, we lose sight of these ideals at times. It requires continuous study to keep our work up to the proper level, especially when noted artists tell us that we have no permanent standard in America on

Fig. 6.

which to base our judgment, as did the Greeks and Romans, but we must work out each individual case as that type indicated. In an article by Dr. Angle, September, 1903, he stated that the best balance, the best harmony, the best proportion of the mouth in its relation to the other features requires that there should be the full complement of teeth, and each tooth shall occupy its normal position, i.e., normal occlusion. This law in possibly a large percentage of cases will hold true, but since the advent of radiography in orthodontia many of the unseen stumbling blocks have been revealed. Every once in a while the truth of this is burned more deeply in my mind when I meet in the store or on the street, an old patient whom I treated a number of years ago. In every instance where I have noticed the drifting mesially of buccal teeth, thus throwing out of balance the beautifully adjusted arches, the radiograms have disclosed impacted thirds.

The past five years in which I have been studying this condition I have never regretted having advised extractions to overcome the third molar influence. You have all heard the expression from parents and friends of some of your patients, "Jane's face seems too full, I do not think the treatment has benefited her appearance." To such I have endeavored to explain that there are two stages in a child's life in which if Nature has done her duty or has been assisted in creating the normal development of the jaws, the face from a line drawn just beneath the eyes appears to be overdeveloped. These two periods are from four to eight years and from twelve to fourteen or fifteen years.

It has been stated by good authority that the mesio-distal length of the upper and lower jaws should, if normal, have its full development (with the exception possibly of the third molar space), at eight years.

Fig. 7.

Formerly I did not believe that heredity had very much influence in cases of malocclusion, but I am more firmly of the belief that where the maxillary bones proper are involved, hereditary influences could be given as the etiology. One of the effects of this influence is these cases of Class II with undeveloped symphysis, and it is around these cases that I wish most of the discussion could rest.

I have about come to the conclusion that in these types of cases the best thing is the extraction of some teeth in the upper jaw. What teeth these should be cannot be laid down as a hard and fast rule. Here is where you can display your ability as a student of the facial art, in order that the appearance of the receding chin may be reduced to the minimum. (Please note I said appearance). For no matter how perfectly the teeth are moved in normal occlusion

there will still remain a facial unbalance). In a number of these cases I have found that the lower incisors were moved mesially beyond the point of development of symphysis which, of course, would throw into more prominence the look of undevelopment at that point with no hope of Nature overcoming the defect. In these cases I have extracted the upper second molar and allowed the lower teeth to drift distally to harmonize as far as possible the facial balance. This does not make a perfect art balance of the face, but relieves to a great degree what would otherwise be a bad facial deformity with normal occlusion.

The sad part of these cases is that usually the lack of development of the symphysis does not begin to show until about twelve years of age, so it raises the question whether it would give us more satisfactory results if the upper first premolars were extracted instead of the second molars. I have always felt I obtained a better balance of the features by the latter method. These types of cases have been some of the most trying I have had to deal with, because of this facial unbalance over which we have little control.

DISCUSSION

Dr. Leland E. Carter, San Francisco, Calif.—Dr. Morehouse is to be congratulated upon his most interesting and instructive paper. To use an old and time-worn expression "he has given us considerable food for thought."

Here we have a paper of inestimable value to the members of this society, written by one who has been a close observer and who has gathered many valuable facts from years of clinical experience. Theories without conclusive evidence cannot compare in value with such facts as this paper brings forth.

Dr. Morehouse besides giving us some interesting facts has presented some problems for our consideration and perhaps the clinical experience of some of the members of this society may furnish the necessary data from which to draw conclusions.

The paper merits a generous discussion, and I trust all present will take advantage of the opportunity to enlighten us further.

One of the outstanding features of this paper is that it is an eloquent argument in favor of the use of radiograms in connection with all cases of orthodontic interference. Without the x-ray Dr. Morehouse would not have been able to obtain ocular proof of the disturbing factors in these cases, and while I will not go so far as to say he would not have found a solution, there is no doubt, but that radiography relieved him of much worry and made his success more certain.

My own clinical experience substantiates the conclusions to be drawn from the first three cases mentioned and shown upon the screen; i.e., that the third molar is capable of causing malocclusion or preventing its permanent correction by exerting an unnatural force upon the other teeth in the arch, and that when good and sufficient evidence of its disturbing influence is obtainable, we are justified in extracting a tooth to relieve or overcome this force. No hard and fast rule can be laid down to govern these cases. We must take into consideration all the clinical factors and let our experience and judgment guide us in the selection of the tooth to be extracted.

For my own guidance in such cases I have adopted the following rules: First: Do not decide to extract until a careful study and restudy of the case has been made from articulated models and a radiographic survey, and until every available method of procedure without extraction has been carefully considered. Second: If extraction seems unavoidable, adopt the best method of correction without it and when, in the course of the operation it becomes absolutely evident that the desired result cannot be obtained in that way, it will still be time to extract and change the method of procedure.

Inasmuch as Dr. Morehouse has characterized the reading of his paper and its discussion as an exchange of confidences, I must admit that the problems presented in Figs. 4

and 5 have given me no little concern. I must confess that I have insufficient data derived from personal experience upon which to draw conclusions and therefore cannot discuss this phase of the subject in its entirety.

While I have had a great many cases with a premolar impacted on one or both sides, I have never found it necessary to resort to extraction, except the third molar. The proper procedure, of course, depends upon the clinical factors encountered and no hard and fast rule can be formulated covering these cases. We must take into consideration that condition of the investing tissues as well as the erupted and unerupted teeth.

All data and clinical experience in the treatment of these cases is valuable and I trust the following discussion will bring forth some case records.

In reference to Class II, cases complicated by a lack of development in the region of the symphysis meati, I was of the opinion that due to the fact that ossification of the mandible is completed very early in life such a lack of development would be noticeable long before the twelfth year. As to whether or not these cases are the result of hereditary influences there seems to be a considerable difference of opinion. However, I am of the opinion that some of the failures in these cases are due to the fact that the patient allows the mandible to move forward thus overcoming the pull of the intermaxillary rubbers and leading one into believing the teeth have moved. Where the appliances are removed, the jaw gradually moves back into its old position and the case is said to have relapsed. There are some cases, however, that do not seem to respond to treatment, such as Dr. Morehouse has mentioned, and it will be interesting and instructive to hear the views of some of the older and more experienced members of this society.

In conclusion I wish to thank Dr. Morehouse for having given me some very profitable moments, and I am sure that all present are better off for having listened to his paper.

Dr. A. A. Solley, San Francisco, Cal.—I am coming more and more to believe that radiograms are as important as are our models, and I think we should not undertake any case without first getting a complete set of x-rays. In regard to lack of development of the symphysis in Dr. Morehouse's case, I wish I had known he was presenting it as I have a duplicate of it, and it has been under my care about five years. But this one showed up about the fourteenth year, and I thought I had a pretty fair result until a year and a half ago, when the case came back and I had a shock when I saw it. Like Dr. Morehouse, I was quite in despair. However I have placed the patient in charge of a gymnastic teacher. We are trying to get the child to work on the bar, with the chin resting there for support, and see whether that will help. I will promise Dr. Morehouse to give particular attention to this case, and probably in the next year or so can give him complete data.

Dr. John V. Mershon, Philadelphia, Pa.—I am deeply interested in the subject presented by Dr. Morehouse. When a subject is presented to which you agree you think it is well done no matter how bad it may be. This is no reflection on Doctor Morehouse's paper. What impressed me in the pictures and in the presentation of facts by Doctor Morehouse, was how he has proved that the orthodontic problem is not primarily a tooth problem. It is a developmental problem.

Cases that come to the orthodontist present themselves because there is a failure on the part of Nature to develop the human being according to Nature's predesigned plan. If the development of the individual was according to this predesigned conception of Nature he would not come to us. If we could only think in terms of growth and development and not in terms of teeth, and study growth as a problem whether in plants or in the lower animals.

Growth is not continuous, it does not take place in all parts of the body in perfect unison. A child may go on for several years with no increase in girth, but all the increase may be in height. One period may show growth of the arms, then of the chest, you may have it in the face likewise, and we expect when treating our cases with mechanical appliances to apply force with mechanical efficiency, (which should be physiologic efficiency) and have the patients to progress and develop in two or three years to a degree that nature under the most favorable circumstances requires eighteen to twenty years to accomplish in the devel-

opment of the face, it cannot be done. Many patients that we have dismissed at fifteen or sixteen years of age possibly will not arrive at a complement of development until possibly twenty-five or twenty-six years of age. One child may be in a certain grade in school at eight, another at ten or twelve, and so on. We have a mental age, a dental age, and a developmental age, and all may be different.

A diagnosis cannot be made from models. A model is an inanimate thing, it shows only the tooth arrangement.

You must know your individual, you must see your patient and examine him. It is my practice to make a physical examination of the child. With my imperfect knowledge and poor facilities you can imagine how imperfect that examination, and yet I find where I have a marked malocclusion, I can find physical defects in body development. Frequently I can detect a curvature of the spine, lack of muscle tone, and so forth. You will find many children with ankles beginning to show evidence of fallen arches, and you will find the muscles of the mouth weak and flabby. We only treat locally and mechanically the symptoms which are general constitutional conditions.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Necessity of a Knowledge of Differential Diagnosis in the Therapeutics of Focal Affection. Reed. Dental Cosmos, July, 1920, lxii, No. 7.

When a physician sends a patient with rheumatism or nephritis to the dentist for examination of the teeth, the dentist calls in the radiographer, and when the latter indicates that certain teeth are abscessed or beyond repair, removes them, but very likely without benefit. After a few such experiences both doctor and dentist become disgusted and abandon outright the conception of focal infection in pathology. To obviate this state of affairs patients should not be referred to the dentist on the merest suspicion, but a diagnosis of focal infection should be built up from an entire investigation of the organism. The history and presence of a diseased mouth may be the sole etiologic factor which can be isolated, or may be only one of several; in which case the infected mouth may only be a contributory factor and in the latter case extraction will not affect a cure. The author has found syphilis a conspicuous factor in alleged focal infections. That is, the condition was not focal infection but syphilitic manifestations which in association with a bad mouth mimicked focal infection. Another class of patients often wrongly regarded as of this type complain of chronic digestive disorders which they ascribe to bad teeth. In a case in point the primary condition was gallstone disease which had apparently contributed to the presence of infected mouth. Foreign bodies, painful flat feet, spinal growths, are a few of the conditions which may wrongly be referred to bad teeth. The author implies that a diagnosis of focal infection should be made by exclusion of all other possibilities.

Vincent's Stomatitis and Associated Manifestations. Buehler. Dental Cosmos, July, 1920, lxii, No, 7.

The author reports jointly on 175 cases of Vincent's stomatitis and 153 cases of pyorrhea alveolaris. The affections are associated because the bacteriology was identical, every case of either affection, showing the peculiar spirochete and fusiform bacillus. Symptoms of stomatitis were typical, comprising sore gums which bled on the slightest contact, fetor of breath, rusty or bloody sputum, swollen gums with small ulcers covered with membrane, malaise, defective mas-

tication, and secondary involvements. The four locations so-called are the gums, buccal mucosa, hard and soft palate and fauces, and at least two of these are involved in the majority of cases—and one of the two is the gums. The causal factors are defective or absent oral hygiene, faulty crown and bridge work, poorly inserted fillings and traumatic malocclusion. It will be noted that the author does not allude once to cutting the wisdom teeth or similar developmental factors. There is no allusion to gangrenous stomatitis. Diagnosis is always made with the microscope and bacteriologic technic for it is necessary always to exclude both diphtheria and syphilis. Treatment which should be kept up until the mouth is sterile of the organisms, consists of dental work such as scaling, and disinfection by the usual buccal antiseptics, 20 per cent sulphate of copper solution being employed as a mouth spray. This salt may almost be regarded as a specific for Vincent's stomatitis and should be used as a wash as well as spray. The author goes minutely into the technics of salvarsan exhibition. It is hardly necessary to add that from the author's views pyorrhea alveolaris, being of the same origin, receives the very same treatment as stomatitis and the author does not attempt to treat the roots at all.

Dental Sepsis in Children: its Consequences and Treatment. F. S. Steadman. Proceedings Royal Society Medicine, London, 1920, xiii, Sect. Odontol., 37.

The author formerly shared the popular opinion that the condition of pale-faced, tired-looking, under-weight, and mentally inefficient children was usually the result of semi-starvation due to poverty. He has discovered, however, that in a large percentage of cases carious deciduous teeth and first permanent molars, exposed and putrescent pulps, and abscesses about the teeth are etiologic factors, and that extraction of the teeth is followed by restoration to health.

One of the chief causes of the deterioration in health is loss of sleep due to the pain associated with the dental condition. Other causes are gastrointestinal disorders. The rapid clearing up of the latter after the extraction of the teeth is similar to the improvement noted by Waller in sickly breast-fed babies after the extraction of septic teeth in the mother. Oral sepsis may aggravate existing anæmia, tuberculosis, typhoid, and scarlet fever and may result also in septicæmia and endocarditis. Locally it may spread to adjacent tissues causing pharyngitis, tonsillitis, otitis media, etc. Finally it may be the cause of enlargement of the lymphatics draining the area involved. This clears up if extraction is done early.

The author's treatment consists in the extraction of all deciduous teeth with infected pulps and generally of their antagonists in addition. Permanent molar teeth with roots not fully formed are also extracted. Pulp capping is condemned. The argument that extensive extraction is not advisable as it causes a loss of the power of mastication is futile as this power is already lost before the extraction. No child will masticate on tender teeth and exposed pulps. The argument that extraction prevents the proper growth and development of the jaws is also untenable in the majority of cases. Unilateral mastication should be prevented as it causes a marked gingivitis on the unused side. All condemned teeth should be extracted at one time under a general anæsthetic such as ethyl chloride.

Osteomyelitis and Osteoperiostitis of Dental Origin. Landetey Arago. La Odontologia, March, 1920, xxix, No. 3.

The author considers maxillary osteomyelitis of dental origin which does not arise unless the pathogenic organisms have actually gained the interior of the bone, as through infected pulp or alveolodental "arthritis." In cases of extraction with fracture of the alveolar process an opening is apparently made for the entrance of germs. The fact that extraction is often followed by necrosis of the maxilla was known as far back as Heister's time and this author warned against extraction in inflammatory affections of the jaws. In such cases, however, the germs have really penetrated into the substance of the bone before extraction. Jarre has shown the frequent connection between affections of the six year molars and osteomyelitis. The author has made numerous bacteriologic studies and finds that the germ content is very mixed, no less than 6 or 7 organisms being present in more or less of symbiosis: in the order of frequency these are the staphylococcus, pseudodiphtheritic bacillus, streptococcus, Vincent's fusospirillary association, various gram-negative diplococci, bacilli of the coli type and Pfeiffer's coccobacillus. Several photographs of cases with the sequestra and radiographs are appended. In several of the cases the entire lower jaw was involved in the necrotic process, while in one there was a spontaneous fracture of the bone. In a case of chronic osteomyelitis the swelling suggests that of a sarcoma. Cases of angular and diffuse osteomyelitis cause characteristic unilateral and bilateral deformities. The article will be continued in the following issue.

Report of Two Cases of Lung Abscess Following Tonsillectomy Under Local Anaesthesia in Tubercular Subjects. J. R. Simpson and H. G. Noah. Pennsylvania Medical Journal, 1920, xxiii, 322.

Contrary to the commonly accepted view relative to the causation of lung abscess following tonsillectomy, the authors believe the two cases here reported were due to hematogenous infection because of the following facts:

1. Both patients were operated on under local anæsthesia in the upright position.

2. The mouths and throats were in a septic condition before and for some time after the operation.

3. The late development of symptoms (eleven and twelve days after operation) points to a blood-stream infection.

4. The abscess developed at the site of the tuberculous lesion which in both cases was in the upper and middle lobes.

The conclusions drawn are:

1. During or following operation septic material enters the veins, passes through the right ear to the lungs and, in the presence of a tuberculous lesion, finds there suitable soil for the formation of an abscess.

2. The possibility that the aspiration of infected material may be a cause of pulmonary abscess is not to be denied, yet a greater number of such abscesses occur as a result of hæmatogenous infection than is generally supposed.

Surgery of the Tonsil. H. C. Todd. Journal Oklahoma State Medical Association, 1920, xii, 100.

In the author's opinion adhesions and contractures following certain tonsil operations are due to: (1) trauma or destruction of the tonsillar plicæ or the tearing of their attachments, or (2) trauma or destruction of the muscles or their aponeuroses which form the tonsillar fossæ.

The plicæ, anterior and posterior, are the superficial layers of the mucous membrane in which the tonsil is developed. The structures deepest in the tonsillar fossæ are the musculature of the tonsillar pillars. The superficial structures are, first, the aponeuroses of these muscles; next, the basement membrane of the mucous membrane enveloping the tonsil; next, the tonsil itself; and then the anterior and posterior plicæ, the layers of the mucosa other than the basement membrane which lie upon the tonsil and partly envelope it. The anterior plica or plica triangularis alone is constant, but both, when present, are continuous at the tonsillar margins with the mucosa of the tonsillar pillars and therefore with pharyngeal walls.

The author contends that these plicæ must be carefully dissected up rather than torn from the subjacent tonsil. Next, the capsule should be separated from the muscular aponeuroses without injury to the latter or the now loosened plicæ. For this step especially Todd recommends tonsillar scissors or Pierce's sharp spoon dissector. In the next step in the operation the base is detached with the aid of a snare.

When the plicæ are preserved they partially line the emptied fossa without contractures and give off epithelial buds which further hasten a smooth healing.

Three Cases of Death Following Injection and Extraction. Ritter. Zahnaerztliche Rundschau, June 8, 1920, xxix, No. 23.

In the first case a patient was sent to the author, who is a forensic expert, by a practising dentist. The face was swollen on both sides, the lower jaw painful to the touch and there was fluctuation over it with marked general reaction including fever. Incisions were made along the alveolar border, with cold poultices, and some improvement resulted but as sepsis seemed impending the case was sent to the hospital and ended in death. It was brought out that patient had originally visited a dentist who anesthetized the gum although at the time it was swollen. The effect of the injection was the formation of an abscess—a phlegmon of the floor of the mouth, which led to sepsis. It is not known that the injection was actually responsible for the phlegmon for the latter occurs spontaneously. Operation failed to save the patient. Phlegmon of the floor of the mouth most commonly follows caries of the teeth to which has been superadded inflammation of the periosteum of the root. It is not necessarily to be inferred that injections act in these cases as contributory factors. In this case no extractions are mentioned and the injections—probably of a mixture containing cocaine—appear to have been given to relieve the pain of the ulcerated tooth. In the second case two injections of novocaine into the gum preparatory to extraction ended fatally in a short time. The patient collapsed as a result of the injections and then went into a fatal swoon when the tooth was pulled. In the third case

the tooth in question was a bicuspid which was giving much pain and the dentist extracted it after the usual novocaine injections. The lower jaw then swelled to such an extent that patient was sent to the hospital where he died of sepsis. But the empty socket where the tooth had been exhibited no inflammatory reaction and the expert declaration was to the effect that the exact cause of the sepsis was a mystery.

Conduction Anesthesia in Buccodental Surgery. Bercher. La Revue de Stomatologie, 1920, xxii, No. 5.

Credit for introducing this form of anesthesia in France is due to Pauchet, whose technic has been followed by numerous authors with or without slight modification. The mouth, teeth and lower face are supplied by the superior and inferior maxillary branches of the trigeminus, so that nerve blocking in surgery in these regions must be directed to one or both of these nerve trunks. The ophthalmic branch has no interest for the stomatologist. The superior maxillary is purely a sensory nerve, the inferior has in addition motor fibers. Blocking the superior branch may be affected by three routes, the anterior or orbital, the inferior or buccal, and the external or malar. The first named is of theoretical importance only, for the patient will not consent as a rule to a puncture in the orbit. The second or buccal route is condemned by the author for two reasons—inefficiency and hazard of injury. There remains the external route as recommended by Matas and the only one which appeals to the author. The technical steps are too long to reproduce and may be found in systematic works. In regard to the inferior dental nerve, it is not necessary to block the main trunk, for this step can be limited to the inferior dental branch which is accessible at the internal aspect of the ascending ramus before it enters the bony canal, at the level of Spix's spine. The author uses either 2 per cent stovaine or 2 per cent novocaine with adrenaline addition. Indications for nerve blocking are numerous and need not be recapitulated. As for the results with proper technic these are constant and perfect; the author has had but three backsets not to be charged to the method. This does not mean that there are no complications, for the author has had cases of partial syncope due apparently to the use of the sitting posture and some postoperative inconvenience which yields to aspirin.

Phlegmon of the Chin Region. Herpin. La Revue de Stomatologie, 1920, xxii, No. 5.

The author reports a case of phlegmon the origin of which was unsuspected over a period of seven years. In 1903 a young lad of 12 years exhibited a progressive swelling in the region of the chin without premonitory symptoms. It reached its maximum in about a week, when a provincial dentist extracted certain temporary teeth, accidentally including a permanent lower canine. The swelling was not favorably influenced and pulsation and lymphnode enlargement were noted. The mass was now opened with the thermocautery, much pus issuing with rapid subsidence of the swelling and other symptoms. The cause of the lesion was unsuspected. There was a latent interval of 3 years at which

juncture a new swelling appeared in the same area. The dentist removed a carious lower molar, the abscess matured as before and was as before opened with the thermocautery, with the same result. Another latent interval of four years was followed by a third tumefaction of the chin, this time apparently determined by a blow. The condition was unlike the preceding for when the swelling was lanced on either side of the chin no pus appeared. A surgeon was now called in and made an extensive horse-shoe incision which gave vent to much purulent fluid. The resulting wound was drained for a month before it healed. The x-ray threw no light on the nature of the process. In another three months there was a recrudescence and a decayed molar was removed without benefit. The author now saw the case for the first time and found a small fistulous tract to the left of the frenum of the lower lip leading to the root of a discolored lower lateral incisor. This evidently marked a slight injury received in childhood while engaged in boxing. The necrotic root of this tooth had evidently been responsible for all the mischief and upon its removal there was no further trouble.

Actinomycosis Considered Specially In Its Relationship To The Jaws. V. Zachary Cope. The British Dental Journal, 1920, xli, No. 14, p. 649.

Chronic inflammation caused by infection with the ray-fungus, a streptothrix, is of fairly frequent occurrence, especially in the region of the lower jaw. Infections round the face, neck and jaws outnumber all those in other parts, the buccal region being by far the most common to be infected. If infection takes place through the gums or teeth of the lower jaw, there may result a small induration on the outer aspect of the horizontal ramus, or a more extensive condition involving the cheek and parotid region, the most typical form of actinomycosis. The lower jaw may be the seat of a primary focus which starts by the entry of the streptothrix through a diseased tooth socket. Submaxillary infection is undoubtedly in some cases the result of the fungus gaining access along Wharton's duct, but it is not likely that the more common mode of entry of the organism is through the mucous membrane of the floor of the mouth or alveolar margin. Secondary infection is common; the mouth contains many varieties of bacteria, and these frequently gain access to the tissues at the same time as the streptothrix. The skin over a buccal actinomycotic focus is usually unaffected for some time.

Cervico facial actinomycosis, which causes a swelling of the side of the face and the region of the angle of the jaw, presumably has its origin, in the majority of cases, through an entry of the fungus into the connective tissues of the gum near the lower molar teeth. In some cases the only abnormality discovered inside the mouth has been a carious lower molar or its stump. In younger persons with perfect teeth, an opportunity of entry for the fungus may be furnished by the eruption of a tooth. This form of disease is characterized by a swelling of the cheek, which extends from the zygoma above to the inferior border of the mandible below, and from the ear to the anterior border of the masseter. Within three or four weeks a firm swelling is formed which has its maximum at the junction of the horizontal and ascending rami of the jaw. A marked sympton at this stage is trismus, the patient experiencing great diffi-

culty in opening his mouth. The further course may be one of progressive hardening or softening; the latter leads to the formation of an abscess containing the typical granular. The best and only certain way of diagnosing the condition early is a routine examination of the discharge from all chronic abscesses. Actinomycosis in the buccal region must be differentiated from many other pathologic conditions. Treatment yields best results in the face and neck regions. If the lesion is in a region where the whole affected area can be removed the prognosis is very good, but excision of the whole infected area is rarely possible.

The Focal Theory of Infection In Its Application to The Teeth. Howe. Journal of the National Dental Association, July, 1920, vii, 7.

The author's conclusions to his article, which is a serial one, are in part as follows: the experimental evidence as to the dental causation of general diseases is not satisfactory, as there are other and more natural explanations. Much harm, little good, has come from this mistaken viewpoint. The teeth are an essential part of the organism and the disturbances which occur about them are local and amenable to local treatment. Diseased areas should be cleaned up and without the infliction of any kind of trauma. X-ray shadows are not equivalent to disease, for cicatricial tissue present the same appearances. Toothless people are not free from the troubles attributable to diseased teeth. Bacteria are not necessarily pathogenic. At the present time we are overrating infection as a cause of disease and underrating other factors such as high-tension living and errors of personal hygiene. The genuine infections about the teeth, which are rarely seen and which may be guilty of some of the charges made, never occur in a person who is under the care of a good dentist; but even in such a case the poor general condition would be more apt to be the cause and the dental infection the result than the reverse state of affairs. In thirty years practice the author has never seen a case of streptococcus viridans infection which proceeded from the teeth. In alleged root infections the streptococci may not represent the original focus but may themselves have gained the locality from some true primary focus. It is possible by means of the technic in use to prove that a large proportion of teeth with normal pulp are infected. The author will continue his serial article with the subject of root canal filling.

Ludwig's Angina; Vaccine Treatment. Sahagun Torres. La Odontologia, March, 1920, xxix, No. 3.

The French object to the term "Ludwig's angina" because they make the claim that Geusoul anticipated him in the recognition of this condition by six years, and further because the condition is not an angina, but a septic phlegmon or submaxillary cellulitis or sublingual phlegmon. The mortality of this affection is still notably high—about 60 per cent. Left to themselves, four out of five patients die and in late intervention three out of five. In a material of unselected cases 38 patients sustained 17 fatalities. Of the 21 recovered cases 12 had received surgical treatment. On the other hand in 14 modern cases with timely intervention but 4 deaths occurred. The author relates a personal case at great

length. By reason of the gravity of the case and the likelihood that despite operative intervention a fatal result might not be averted the author obtained pure culture of staphylococci (polyvalent). At 8 o'clock in the morning, 24 hours after the inception of the symptoms, an injection was made in the right deltoid region. A negative phase developed with aggravation of the symptoms which was followed by improvement, and six hours after this injection the fever had dropped 3 degrees and the patient was sweating. The injections were repeated, and while the improvement was not striking, it was constant and unmistakable. On the third day pus came away through a fistulous opening and from this time improvement was rapid.

The Dental Hygienist as a Factor In Dental Progress. A. H. Stevenson. New York Medical Journal, 1920, iii, No. 24, p. 1024.

The author summarizes his presentation of the subject in concrete form as follows: (1) The dentist as the guardian of the oral health of the community can no longer disregard preventive measures as a part of daily practice. (2) The prevalence of dental caries should be minimized by systematic oral prophylaxis under the direction of the dentist. (3) If the burden of professional duties prevents the dentist from giving this service to his patient he should provide adequate assistance. (4) The dental hygienists should be properly trained and regulated by law. Where she has been given opportunity she has met all expectations. (5) Whether she labors in a private office or in public institutions, she is rendering humanitarian service and the future distribution of her labor will ultimately be adjusted by the law of supply and demand. (6) The dental hygienist is an important factor in the progress of dentistry and the elevation of her service is a matter of concern to the dental profession which shall always supervise her activities. (7) It devolves upon the dental societies to instigate appropriate legislation legalizing the dental hygienist in every state in the Union, as all such legislation should be initiated by the dental profession.

Bone-Grafting Of The Fractured Mandible. Gilbert Chubb. The Lancet, London, 1920, ii, p. 9.

Summary:—The series consists of 60 consecutive cases of bone-grafted mandibles. Of these all but two were free autogenous grafts from the ilium. Fifty-one possessed edentuious posterior fragments and in 40 of these the loss involved the region of the angle. In 16 of the latter the loss involved the ascending ramus also. Firm bony union was obtained in 56 of the cases, 93 per cent of the series.

The graft and jaw fragments were so trimmed as to fit accurately end to end, with the largest obtainable areas of exposed vascular bone tissue held in close contact by firm wiring. The close apposition results in early bony union, while the firm fixation allows of the bones being subjected at once to some degree of muscular strain without fear of displacement, thus leading to the early consolidation of the primary union. In over 60 per cent of the successful cases the union was of ivory hardness on the final removal of the splints, three to four months after operation.

Precocious Alveolar Atrophy. Kuntz. Zahntechnische Reform, July 11, 1920, xxiv, 28.

The author first mentions the great interest at present in alveolar pyorrhea, with especial reference to the neosalvarsan treatment; which by the way is not fulfilling the early hopes engendered by the supposed spirochetic causation of that disease. But this attitude takes no account of presenile atrophy of the alveoli and certain gingivites. Among the latter there is said to be one which is attributable to the biting quality of English cigarettes now sold in Germany. Presenile atrophy begins in middle age and is not accompanied by any failure of nutrition and the forces. The symptomatology of presenile agrees closely with that of senile atrophy. The teeth appear longer than normal while the gums are quite intact. There are no pockets as in pyorrhea. The exposed necks of the teeth appear sound and generally speaking presenile atrophy, like pyorrhea itself, does not occur in carious mouths. The subjects have usually taken care of their teeth. The sensitive dentine has its natural sensibility much reduced. The dentist can drill close to the pulp without causing pain, and sometimes the sound pulp cavity is entered without pain. This means that the pulp itself is undergoing atrophy. It is singular that those who suffer from presenile atrophy are mostly people of good constitutions and otherwise well preserved. The only causal factor which can be accused is malocclusion and neither infection nor constitutional disease will explain the condition. It may be said, moreover, that the condition attacks the better classes—the educated and well to do—whence neurotic causal factors have been evoked. Excessive and improper use of the toothbrush is not mentioned by the author as a possible causal factor. The article closes with case histories.

Influence Of Buccodental Sepsis And Periapical Foci On The General Condition. Lagrange. La Revue de Stomatologie, 1920, xxii, No. 6.

The author gives in detail six cases in addition to discussing the entire subject. His conclusions are as follows: in any suspicious case there should be a thorough examination of the dental system. Any treatment carried out should be as conservative as possible. If no other foci or explanation of the condition can be found other than the teeth pulpectomy should be preferred to avulsion in the attempt to preserve devitalized teeth. Devitalization of sound teeth, however, should be regarded as a very serious matter.

The author's second case is as follows: Patient, a girl of sixteen, all teeth living (but some with nonpenetrating caries which had been filled by the author) with two exceptions, recognized as having necrotic pulps. These were the two upper left premolars. The dead pulps were removed entire, the canals filled with eugenol and the cavities obturated with cotton and varnish. The patient was expected to return in two days but was not seen again until five months. She had had no trouble until attacked with severe pains in the left thorax two months before. The dressings were removed and a necrotic odor noted. The apical region was very sensitive to pressure. The author did a preliminary disinfection of the canals and the pains at once improved. They did not vanish entirely until the tooth had been extracted.

Anesthesia By Intraligamentous Injection. Chompret, La Revue de Stomatologie, 1920, xxii, No. 6.

The author refers to the circular and intraalveolar ligaments. Thus far but little attention has been paid to anesthetization of the tissues which connect the teeth with their sockets and which are ruptured when the teeth are extracted. It is considered sufficient to inject the solution into the cellular submucous tissue of the gums. In this manner the terminal ramifications of the sensory nerves are not reached. After the injection the solution infiltrates into the periosteum, the osseous alveolus and the intraalveolar ligament last of all. Fortunately the circular ligament, being directly continuous with the mucosa, comes under the anesthetic promptly. The thicker and denser the alveolar process, the more it is calcified, the longer it takes to secure analgesia and the latter may even fail to involve the intraalveolar ligament of a given tooth which is to be extracted. The author has recommended this field of anesthesia for the past 15 years. Nogue in his work on anesthesia mentions it, but adds that it has not been found practicable. The author insists that this statement is an error and gives his technic as follows: he takes the finest needle obtainable, having the length of 1 cm., of which the bevel must not be too sharp. This is directed perpendicularly to the axis of the tooth and buried directly into the circular ligament. As this puncture may be painful the gum is first rubbed with a mixture of cocaine, menthol and phenol, one gram each. One minim each is injected into the mesial and distal aspects of the tooth. This procedure anesthetizes only the circular ligament, however, and to reach the intraalveolar ligament the syringe should make an angle of 20 degrees or more with the axis of the tooth, with the bevel of the needle in contact with the neck on either the mesial or distal side, passing directly beneath the circular ligament, and as far as possible into the alveolo-dental articulation, toward the apex of the root.

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EDITORIALS

The Art of Healing

PROFESSOR Arthur Keith, M.D., of London, England, in his inaugural address at the summer meeting of the Incorporated Society of Trained Masseuses, June 29, 1920, discussed the art of healing in relation to teeth. The following is extracted from his address published in the *Lancet,* London.

There are no parts of the body which can better help us to understand the true nature of the art of healing than those structures with which we have been familiar from infancy upwards—our teeth. That most prevalent of all diseases, caries of the teeth, we all have had experience with at first hand. One morning we are surprised to find—or, if we are in the happier position of being able to afford regular visits to a dentist, our dentist is surprised to find—a hole or ulcer eating into a tooth without our being aware of the fact, there having been not the slightest warning or pain. Pain comes when the pulp cavity is reached—pain and plenty of it; but that is too late for Nature to step in and give us a pre-

ventive warning. If a sore or ulcer had formed on the cheek we should have been instantly aware of our danger and have been able to take measures for treatment. We should also know that, in most cases of ulcer or sore, repair will set in and heal the breach. But a hole or ulcer in a tooth will not heal, try how we will; it has no power of repair. The best a dentist can do for us is to clear out the dead tissue, introduce a stopping, and thus avert the disease. The most skilled dentists in the world cannot heal a tooth, cannot make the wall of the cavity produce fresh dentine and new enamel and thus restore the breach; his failure is not his fault, but that of Nature, because she has not given our teeth, for a reason I will explain presently, that virtue or healing power which she has most bountifully bestowed on all the other structures and tissues of our bodies. You will see the point I am trying to score—*viz.*, that if Nature had not endowed our bodies with the power to heal, neither the surgeon, physician, nor masseuse could have done anything whatsoever for the cure of injury or of disease. They could have done no more—perhaps not so much—than the dentist can do for our teeth. They could only have stitched tears of the skin or stopped holes in the flesh. Conceive our condition if such had been the case; the hundreds of men who had broken bones in the accidents of civil life would be walking the streets in splints for the rest of their lives; every one of us would be covered with stitched cuts—often in want of renewal—or with holes which constantly wanted re-stopping, or with ulcers ever weeping, or bruises unchangeably colored as the rainbow. A modern city would be a warren of surgical out-patients, had Nature not endowed the rest of the body better than the teeth. Think of the condition of our soldiers at the end of a war if their bodies had forgotten how to heal! If we remember these things you will see that when we claim a cure we should not forget how much of our success we owe to the bounties of Dame Nature.

Why has Nature been so culpably negligent as to leave our teeth healingness? It is worth some trouble to look into this matter if only to learn how remarkably prudent she has been on our behalf in all her works. If our teeth had been provided with nerves as freely as our skin, then we should have had warning of the first onset of caries, and could have taken steps to remove the disease at its beginning. But then, what about cracking nuts and chewing roots and tough meat, as primitive man had to do? Eating would have been too painful a process to be indulged in. Nature did her best to secure attention to the teeth by awarding the most excruciating of pains to those who do neglect their teeth. Under the circumstances which conditioned her handiwork she could do no more. But lack of nerves does not explain why teeth have no power to heal, although I think that those parts of the body which are most liberally supplied with nerves of common sensation have a better power of healing than those which have a poor supply. The chief reason was that the substance of the teeth had to be made so hard and resistant that it was impossible to introduce into the enamel or dentine those soft living units which we speak of as cells. It is in these living cells that the power to heal lies; enamel cannot mend a breach in itself because it has no cells; bone can, because everywhere it provides minute but comfortable nests or residences for the numerous living units scattered through its substance. If

we would understand the art of healing, then we must know something of the living units in which the power to heal resides.

We must not think that every cell in the human body can play a part in the act of healing. A nerve cell, and it is so also with a cartilage cell, cannot even mend its own body, much less take a part in the healing of a breach or wound; if injured they die. The epithelial cells which cover the skin can, as you know, multiply, spread, and thus cover over any superficial breach of the body. The epithelium which lines the stomach, bowel, windpipe and other canals and passages of the body have also this power. But the cells which have been furnished with the greatest degree of healing power are those of the white connective tissues—the tissues which bind the skin down to the underlying parts and which join together the various parts of the body. Let us suppose a muscle has been ruptured or torn, such as the biceps of the arm. Blood oozes into and fills the tear or breach in the muscle. Immediately messages go out, of kinds we do not yet know, and summon from the rest of the body millions of white blood corpuscles to the site of the injury—the workmen who have to clear away the debris caused by the accident. What interests us most, however, is the behavior of the connective tissue cells lying in the walls of the breach. Up to the time of the accident they have been leading placid, passive lives, binding loosely together the fibers of the muscle without in any way interfering with their contractile duties. In ordinary circumstances they would have gone on performing this quiet duty all their days, just as their forefathers had done for endless generations before them. With the accident their disposition and mode of life change radically and suddenly. They take on, as it were, a fury of action, change their shape, begin to divide and breed, giving rise to broods of builders which are to mend the gap in the muscle. These builders are not poured out as an undisciplined mob; they proceed as orderly marshalled armies. As quickly as they grow out to fill the gap from the sides of the wound they are accompanied by sprouts from the neighboring capillary vessels and are thus furnished with the means of sustenance. When the debris in the wound has been cleared away and the gap thus filled with a new army of connective tissue units, the units or soldiers begin to change from an active to a passive state; they shrink and form a cicatrix—a mere connective tissue cement. In this way Nature stitches the torn ends of the muscle together. We admit that the surgeon may expose the torn ends of the muscles, clear away the blood and damaged fragments, and stitch the torn ends together, but even when this is done Nature has still her operation to perform, for the only stitches which ultimately hold are those inserted by those extraordinary cobblers—the connective-tissue cells. What rouses these armies of menders to action we do not know. The power to heal is one of the marvels with which living tissues have been endowed. Unless it were so the surgeon would necessarily be a mere cobbler. All we do know is that these living units can do their work unaided by any human agency, but we also know we can hinder them as well as help them. Long ago Ambrose Paré put the matter in a nutshell when he said: "I dressed the wound; God healed it."

The art of healing lies, then, not in knowing how we can heal the human body, but in knowing how we can help the living units of the body to perform

this task for us. We have to study and know the habits and proclivities of these microscopic healing units of the body just as closely and well as we watch and note the ways and weaknesses of our best friends. We cannot watch those indispensable healing assistants too closely. John Hunter knew that. Every time he discovered a wound and saw the red granulation tissue building up the gap in the flesh he studied it as a gardener does his most precious bud. He saw that the healing tissue must have quiet and comfort in which to do its work. Think for a half a minute what progress you would make in mending a rent in your skirt if some restless terrier kept tugging at the hem. Your stitches would be ripped out almost as soon as you had tightened them. Think, then, of the uphill task that confronts the armies of cells which are trying to make good a tear or rupture in a muscle, if that muscle continues to be thrown into action. Nature has foreseen their difficulties and throws the muscle out of action. Hunter observed that if a muscle or tendon was ruptured the patient ceased to have the power to call it into action. At a later stage action and massage may become necessary, but of that we shall speak later on. It was long after Hunter's time that Pasteur and Lister discovered microorganisms to be the chief enemies of the healing units. If such enemies can be excluded from the body the armies of healing tissue can proceed quietly about their work of mending; if they are not protected from these invaders they have to fight as well as build. It is like reaping a field of corn with most of the reapers serving as policemen. In this way surgeons greatly improved the art of healing by discovering simply why in some cases the real healers of the body were hindered in their work. Then other discoveries led on to further improvements in the art. It is a discovery of ancient times that the human body, after an attack of smallpox, was immune henceforth from this disease. Jenner found out that he could produce an immunity by vaccinating the body with the lymph of cow-pox. Then later we came to understand that the body of anyone attacked by a contagious or infectious disease was the scene of a widespread and terrific battle invading hosts of microorganisms and defensive mobile armies represented by the white corpuscles of the blood. At first the physician could do little more than look on and pray for the defenders to have the best of the fight, but by patient and continued observation he is learning how to strengthen the defenders by the use of vaccines, antitoxins, and other methods of our modern serum therapy. Here, again, the medical man is not really the healer; that power is inherent in the patient's blood and body; all he can do is to supply such conditions as are within his reach which will give victory to the defensive armies of the body. The best a physician can do is only to hold the lamp while Nature does the mending. But if he knows how to hold it rightly he may well make all the difference in the ultimate results, the difference between recovery and health.

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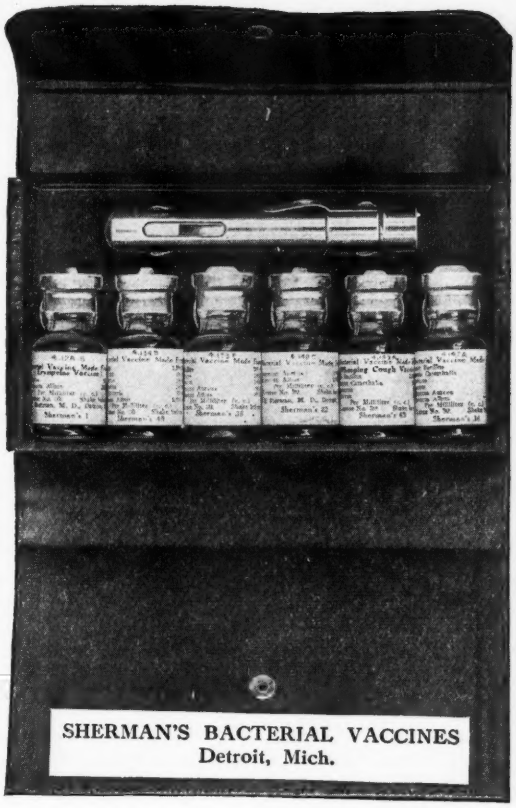

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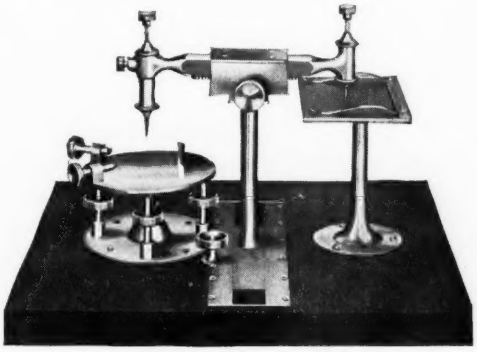

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